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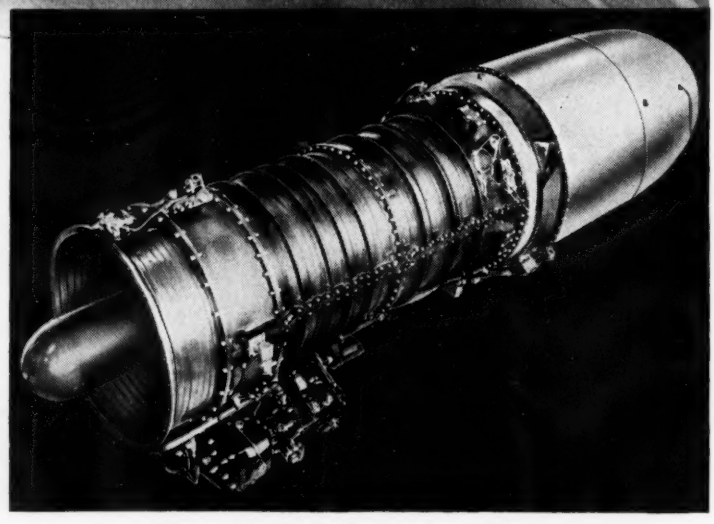

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Vol. 49 No. 3

AVIATION WEEK

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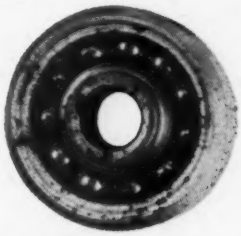
MUST permit removal for inspection and relubrication and be easily replaced.



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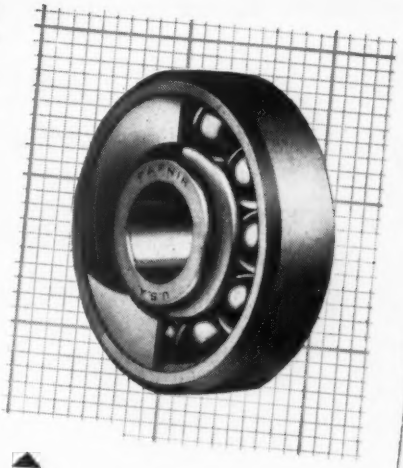

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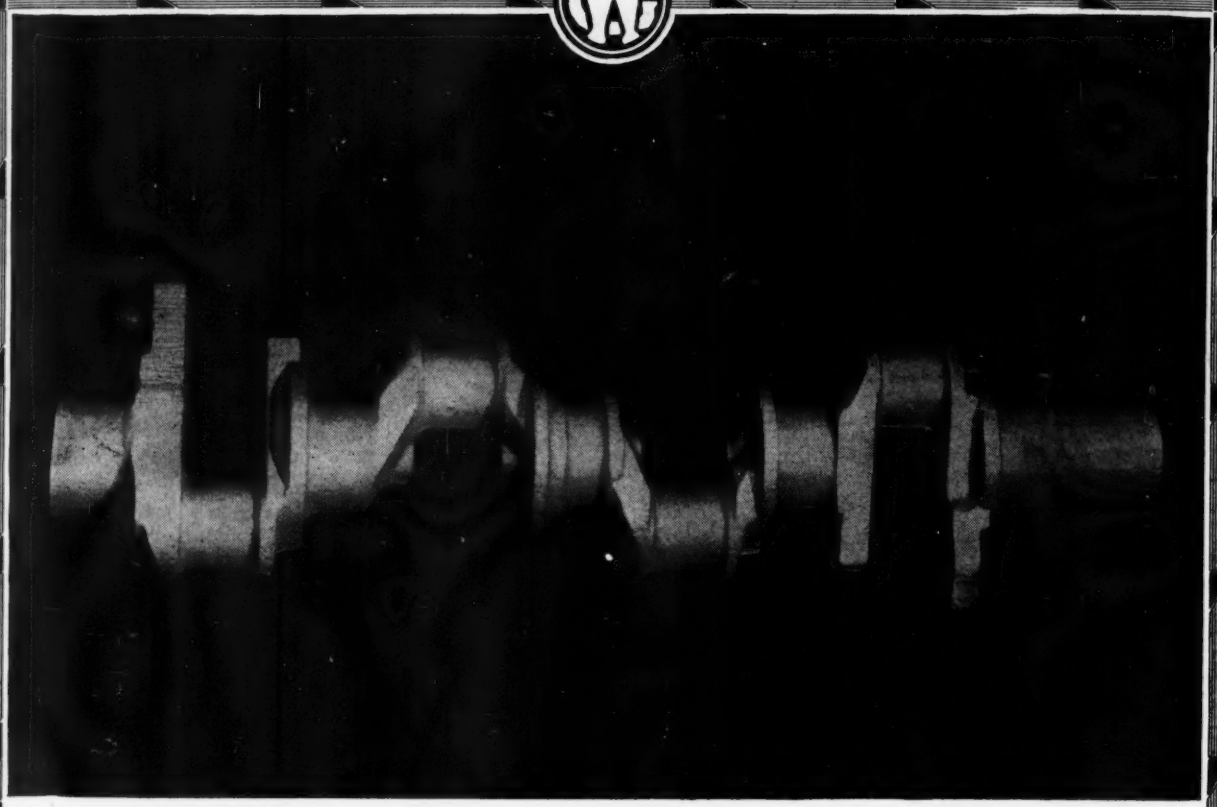

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Longer Life for Feederlines

The national experiment in short-haul air transportation appears headed for a fairly long life, if not an entirely happy one.

Despite rising criticism from an economy-minded Congress and a cost-conscious Post Office Department, most feederlines have an excellent chance to prolong their three-year lease on life. Although worried by the many instances of high subsidies and low traffic volume, the Civil Aeronautics Board has shown no indication that it will abandon the short-haul networks as a bad job.

Certificates Expire in 1949.

Unless extended, the temporary certificates of seven of the ten currently active feeders will expire by the end of 1949. And in three of the seven cases, a decision must be reached before next April.

Best indication of CAB's feeder policy will come in pending investigations to determine whether the certificates of Monarch Air Lines and Challenger Airlines should be extended for a year. Without revision, both certificates are slated to expire Mar. 31, 1949.

Another straw in the wind will be the Board's attitude toward enlarging existing feeder systems. Almost all of the active feeders are seeking major route extensions. CAB would be unlikely to grant any new service to a carrier it might put out of business soon afterward.

Critics Leave CAB.

Prospects that most feeders will receive certificate extensions improved materially with the departure from the board of Clarence Young and Harllee Branch. As early as November, 1946, Young made clear his concern over establishment of additional short-haul operations, arguing that his colleagues were tending to authorize feeder service considerably beyond the scope necessary for an experiment. And before his retirement this spring, Branch suggested that some of the feeders curtail schedules or even suspend service entirely on some of their links because of high costs and inadequate traffic.

There are indications that the current membership of CAB would like to extend most of the three-year feeder certificates to five years. Such a move was urged both by the President's Air Policy Commission and by the Congressional Aviation Policy Board.

At least two members of the five-man Civil Aeronautics Board—Chairman Joseph J. O'Connell, Jr., and Josh Lee—are likely to view broadly their responsibilities regarding feeders. They would have little difficulty in interpreting the declaration of policy in the Civil Aeronautics Act of 1938 as a mandate for the permanent establishment of short-haul air transportation. The declaration gives as the Board's first duty "the encouragement and development of an air transportation system properly adapted to the present and future needs of the foreign and domestic commerce of the United States, of the postal service and of the national defense."

Although Congressional investigations undoubtedly again will focus a spotlight on the high subsidies required by the short-haul operators, there is little likelihood that the death penalty will be demanded with any degree of unanimity when feeder certificates come up for renewal. Communities now receiving local service will fight hard to keep it, and they will make their wishes known on Capitol Hill.

Meanwhile, the ten active feederlines have become a significant factor in the overall domestic air transportation picture. The ten—Pioneer, Trans-Texas, Piedmont, Wisconsin Central, Challenger, Monarch, Southwest, West Coast, Empire and Florida—have assets aggregating close to $10,000,000, around 2000 employes and over 50 transport planes.

By May, the feeders were carrying a record 36,000 passengers monthly, with excellent chances of passing the 50,000 mark by August. Profitwise, the outlook is still bleak, the ten carriers losing around $500,000 in the first quarter of the year. Deficits persisted through April and May.

Trunkline Opposition Continues.

Although their chances for survival appear good, the feeders will continue to be bruised by their critics. Some of the biggest brickbats hurled at the short-haul carriers come from the trunklines.

One of the strongest attacks was recently launched by Eastern Air Lines against Florida Airways, the nation's smallest feeder, which has asked CAB for important extensions.

During oral argument on the case, Eastern's counsel charged that Florida's break-even mail pay need last year was equal to $111.09 for each mail ton mile of service rendered and $66.69 for each passenger carried. By contrast, he said, EAL's mail pay was equal to 44.7 cents for each mail ton mile of service and 89 cents for each passenger carried.

Other trunklines have been more moderate in their attacks on the feeders. But in several recent instances the trunk operators have joined the Post Office Department in asking CAB to withhold certificates.

The trunklines see a tendency for feeder service to compete with rather than complement long-haul operations, particularly since numerous intermediate points listed in short-haul certificates must be skipped because of inadequate airfields. Some observers feel, however, that trunkline managements' major antipathy toward the feeders stems from the realization that both tap the same source for mail pay funds. Trunkline officials believe CAB and the Post Office could afford to be more liberal with their airmail rates were the feeders out of the picture.

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NEWS DIGEST

DOMESTIC

Maj. Gen. Orvil R. Cook has been named deputy director for procurement and industrial mobilization planning, Air Materiel Command, Wright Field, Dayton, Ohio.

Twenty jet fighters, including 14 Lockheed F-80s and six British de Havilland Vampires, prepared to rendezvous in Greenland last week in a two-way crossing of the Atlantic, the first by jet aircraft.

A Boeing B-17 bomber was impounded at Halifax, Nova Scotia, after it took off from Teterboro, N. J., on a reported navigation training flight and landed at Nova Scotia after engine trouble. Plane was reportedly destined for Palestine for use in the Israel battle against the Arab armies.

FINANCIAL

Stewart-Warner Corp. announced net profit of $902,094 or 70 cents per share on sales totaling $17,338,552, for the first quarter ended Mar. 31. Corporation directors declared cash dividend of 25 cents per share on the $5 par value common stock payable July 10, 1948, to stock of record June 10, 1948.

American Cable & Radio Corp. showed net loss for 1947 of $1,525,998. Operating revenues for the year amounted to $21,314,941.

Trans-Canada Airlines reports a loss of $1,761,000 for 1947 in spite of a 40 percent increase in passengers, 38 percent increase in air express and a 19 percent increase in revenue for the year. Atlantic operations provided a surplus of $136,303 over operating costs. This loss is up over the loss a year ago of $1,269,624. TCA carried 427,967 passengers, 1,439,814 lb. of express and flew 1,232,237 mail ton miles during 1947.

FOREIGN

China National Aviation Corp. inaugurated "sleeper" service between Rangoon, Burma and San Francisco using Douglas Skymaster transports. CNAC makes the flight in 51 flying hours with planes leaving Rangoon every first and third Thursday.

Royal Dutch Airlines (KLM) reports an increase in passenger-miles flown in the Caribbean area from 22,500,000 in 1946 to 31,875,000 in 1947. Passengers increased 50 percent from 50,200 to 76,500 and mail shipments moved up from 107,800 lb. to 158,400 lb. Greatest progress was in freight shipments, up from 787,600 lb. to 2,090,000 lb. Three Douglas DC-4 and six Douglas DC-3 transports are used over the 5980-mile network of routes.

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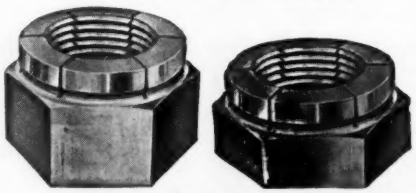

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Vol. 49, No. 3

AVIATION WEEK

July 19, 1948

Huge U.S. Turboprop Program Under Way

$75,000,000 being spent to develop dozen engines that reach new peaks in power.

By Robert McLarren

World leadership for the U. S. in the turboprop engine field is expected to result from a $75,000,000 research and development program—already under way—when the first product of this program, the world's most powerful turboprop engine, starts to fly in the spring of 1949.

Following this first engine, components of which are now being tested, will be six other engine designs, many of them even more powerful.

▶**Dozen Projects**—AVIATION WEEK has learned that both Air Force and Navy Bureau of Aeronautics are pressing work on more than a dozen projects, culled from the most promising of over two dozen initiated after V-J Day.

Navy is showing a clear edge in technical development of the units themselves, but Air Force is indicating more rapid progress in application of this new type of powerplant to production and combat airplane installation.

▶**Farthest Ahead** — Allison Division, General Motors Corp., is farthest advanced among the contractors on several projects including the powerful XT-40 unit slated for installation in the Navy Convair XP5Y-1 flying boat scheduled to fly next spring. This 5500-hp. unit, most powerful propeller-driving powerplant in the world, is actually two smaller units combined into a single engine. Such basic units may be combined to produce three-, four- or more unit engines all geared to drive a single set of counter-revolving propellers.

Another Navy contractor, Pratt & Whitney, is nearing completion on a multiple unit of the original P&W turboprop engine capable of delivering 7000 hp. to propeller shafts. Third major Navy contractor, Chrysler Motors, has already delivered an experimental engine on its XT-36 project but its rating of about 1000 hp. eliminates it from consideration as a powerplant for new combat types. It will be used for experimental testing.

▶**Wright Turboprop** — Leading Air Force contractor, Wright Aeronautical Corp., is already in production on its T-35 turboprop unit, also rated at 5500 hp. This unit was originally slated for installation in the Boeing XB-52, but this latter project may have been outmoded by the new Boeing XB-55 medium bomber, also using turboprop engines.

Air Force also is sponsoring development work on the Frederick Flader and Northrop-Hendy projects, both of which are still in preliminary stage. Both are 7500-hp. units employing multi-stage compressor and turbine units and capable of producing with the static thrust of the jet the equivalent of 10,000 hp. at 375 mph., by far the greatest power ever available in a unit of such small size.

▶**Single Problem**—Navy turboprop engineers point out that the problem of turboprop development is basically one of developing gas turbine units. Therefore, it cannot be divorced from turbojet development as a separate line of effort. For this reason turbojet-turboprop research is fundamentally a single program with the final form of each particular project being largely an engineering and design problem.

This can explain the so-called British "leadership" in the turboprop field. Both nations have placed great effort in gas turbine research, the British applying results to turboprop end-products whereas the U. S. has applied these results to the turbojet engine over the past three years. This fact also is indicative of the leadership of turbojet companies in the turboprop field, a natural product of basic gas turbine development.

▶**Imbalance**—As the Air Force found out with its original General Electric T-31 turboprop units (flight tested in the Convair XP-81 and Ryan XF2R-1 aircraft), a successful turboprop engine is considerably more than simply a turbojet engine with gear box attached. Such a design compromise leads to an engine imbalance that produces destructive vibration.

General Electric has attempted to follow up this engine with the TG-110, an improved version, and the TG-120, a dual unit utilizing two TG-110 units, but has met with many difficulties. The Westinghouse 25-D, a projected 3700-hp. design, an attempt to convert the 24C turbojet into a turboprop, also struck a reef. Further indication of the intense competition in this field is the abandonment of the De Laval Navy project, which consisted of the famed De Laval turbine experience applied to the mating of a gas turbine with a gear box.

▶**Stumbling Blocks**—Compressors and gear boxes are the major stumbling blocks in the turboprop field. Because of the slower speed of turboprop-powered aircraft, as compared to turbojet craft, compression ratio must be considerably higher to provide the same pressure to the combustion chamber without the aid of ram pressure which is available to the straight turbojet aircraft.

Higher pressure ratios mean more stages, improved efficiencies or larger

British Progress

Some indication of British progress in the turboprop field came from London last week when McGraw-Hill World News reported that the Bristol Theseus completed a 500-hr. test run without maintenance.

The run, made for the Ministry of Supply, began June 19 and passed the 250-hr. mark on July 1, averaging 20 hours a day, seven days a week, in five- and ten-hour nonstop cycles at various power outputs. At each stop, the engine was allowed to cool before restarting.

The Theseus was one of Britain's first turboprops to fly. Two models are listed, the Theseus XI and Theseus 21, the former of 2180 hp., the latter of 1950 hp. Fuel consumption for the XI is 129 gallons per hour, and for the 21, 96.5 gallons per hour.

The Mamba and Dart, smaller turboprop engines, are scheduled for the 500-hr. endurance test.

sizes in the compressor, all difficult engineering problems due to their tendency to add excessive weight to the machine.

▶**Fuel Saving**—But the fact that specific fuel consumption of a typical unit can be cut exactly in half by increasing the pressure ratio from two to four is indicative of the enormous advantages that are to be gained along this avenue.

If a pressure ratio of 16 could be attained, a specific fuel consumption of only 0.45 lb. fuel/hp./hr. (same as current high-powered reciprocating engines) could be achieved.

▶**Similar Saving** — Improvements in compressor efficiencies could provide similar fuel savings. An increase in efficiency from 80 to 90 percent would reduce specific fuel consumption from 0.65 to only 0.38 lb. fuel/hp./hr., well below performances of the best of the reciprocating engines and competitive with the promising new compound engine.

A major military problem of the turboprop engine is the fact that its design must be coordinated closely with the design of the airplane in which it will be installed. Since the design cruising speed and design cruising altitude of the aircraft determines in large measure the compression and the jet thrust to be obtained from the turboprop engine, both designs must be carefully coordinated. It will not be possible to select turboprop engines "off the shelf" for a new airplane, as in the case with reciprocating engines.

▶**Advantages**—Appeal of the turboprop engine to the military services lies in its production of heretofore unavailable high power, its low installation weight and its low frontal area permitting "buried" installations. These factors combine to make the engine ideal for comparatively low-speed (300-500 mph.), medium altitude (15-30,000 ft), long-range installations such as the Navy's Lockheed P2V Neptune, Lockheed R60 Constitution, Convair P5Y and the Air Force's new medium bomber and strategic transport designs. In all of these it is presently planned for installation.

However, turboprop leadership is being sharply challenged by the compound engine, which shows superior long-range and high-altitude characteristics at a reduction in airplane speed and load-carrying ability.

But the compound engine is limited by power available from the reciprocating engine to which it is attached. Present indications are that the 4-5000-hp. area is its foreseeable limit. The turboprop engine of tomorrow will be able to deliver more than twice as much, 10-20,000 hp. per unit, for providing bombers and transports with heavy takeoff characteristics.

National Held at Fault in Strike

Emergency board criticizes carrier's labor policies. Offers proposal to end dispute, but report not binding.

Strike of National Airlines' pilots and ground personnel moved toward a climax last week as the carrier re-examined its policies in the light of a Presidential emergency board's finding that NAL's management had violated the Railway Labor Act.

In a report sharply critical of National's labor relations policies, the emergency board recommended reinstatement of discharged union pilots and rehiring of striking clerical and mechanical personnel who are members of the International Association of Machinists.

The board submitted proposals for settling the pilot dispute and offered a procedure to enable NAL and the machinists' union to resume direct negotiations on an agreement affecting hours, wages and working conditions.

▶**NAL Position Difficult**—While not binding on either the carrier or the unions, the board's report places National Airlines in an extremely uncomfortable position. NAL President G. T. Baker has repeatedly assured his non-union pilots that their jobs are permanent.

The Air Line Pilots Association and the International Association of Machinists, whose members have been on strike against NAL for nearly six months, were expected to accept the emergency board's recommendations last week.

But National has precedent if it chooses to ignore the panel's suggestions. ALPA in September, 1946, rejected wage rates and working rules proposed by a similar emergency board and struck TWA shortly thereafter. TWA had accepted the recommendations.

Created by President Truman on May 15, the NAL strike fact-finding group conducted several weeks of public hearings before making its report. Panel consisted of Grady Lewis, Washington attorney; Curtis W. Roll, former justice of the Indiana State Supreme Court; and Walter V. Schaefer, Northwestern University law professor.

▶**Issue Defined**—The board said the sole issue between NAL and ALPA was inability to break a deadlock over the Maston G. O'Neal discipline case. A NAL pilot and member of ALPA, O'Neal was discharged after his Lockheed Lodestar was involved in a landing accident at the Tampa, Fla., airport in September, 1945.

The railway labor act, which applies to certificated airlines, imposes on the carriers the responsibility of "exerting every reasonable effort" to settle all disputes in order to avoid any interruption of commerce growing out of differences with employes. National Airlines, according to the fact-finding panel, did not carry out this duty.

"Over the entire period from the date of O'Neal's discharge on Sept. 27, 1945, to the date of the pilot strike—Feb. 3, 1948—every one of the many efforts to dispose of the dispute was initiated by ALPA," the board declared. "In no instance did the carrier take the initiative, and it was induced to act only when confronted by the threat of a strike."

▶**ALPA Defended**—"What was sought by ALPA was reasonable. It did not seek reinstatement of O'Neal, but only an impartial determination of the propriety of his discharge. Such a determination has not been made to this date. Failure to afford it caused the strike, and responsibility rests with the carrier."

The emergency group recommended that the O'Neal dispute be finally settled through National's system board of adjustment (in which union and company members had deadlocked previously) augmented by a neutral member to be appointed by the National Mediation Board.

▶**IAM Dispute**—In its dispute with the International Association of Machinists, National was unable to negotiate an agreement governing rates of pay, hours and working conditions. The principal point of difference was a provision relating to the right of the carrier to subcontract work.

The board made a finding that National had vigorously fought the organization of its ground employes by IAM and charged the carrier had repeatedly and deliberately violated the railway labor act in so doing.

"By its unilateral actions concerning matters properly the subject of collective bargaining, National violated the duty imposed upon it by statute," according to the emergency board.

▶**Rehiring Urged**—The board urged reinstatement of National's clerks and mechanics who had gone on strike and were replaced by new employes hired—like the pilots—on a "permanent" basis. It added that the parties should defer consideration of contracting out work until other issues are settled.

IAM had contended that National should not be permitted to farm out mechanical work under any circumstances. National insisted on unrestricted rights in the matter.

Berlin Airlift

U. S. support centered at Westover Field, far from the scene.

WESTOVER FIELD, MASS.—This giant air base has played a vital though remote part in one of the biggest post-war logistics problems—the airlift of food and supplies to Berlin.

Touch and go port for more than 40 C-54s, it has processed more than 143 tons of cargo earmarked for Germany, none of it food. Instead, the planes carried spare aircraft parts, maintenance equipment and mechanics.

It was a June 27 radio broadcast, not an Air Force directive, that informed the base that planes from Texas, Alaska and Hawaii would use Westover on their way to join the small number of Army C-47s already carrying cargo in the European theater.

▶**First Trip**—That day, after departure from Bergstrom Field, Texas, the first C-54 cleared with the control tower for Westover on the first leg of the trans-Atlantic trip. An officer sent from Westover to Washington for details and official orders returned with the story.

Since supply stockpiles for this type aircraft were low in Germany, air depots throughout the country would shuttle spare engines and other vital parts to Westover, where they would be loaded on all C-54s going there. The field would perform maintenance on all these planes, so they could be pressed into service on the 265-mile run between Frankfurt and Berlin immediately on arrival at destination.

Parts of the base went on 24-hour duty, the men working 18 hours at a stretch to unload and load aircraft. Depots at San Antonio, Texas, and Middletown, Pa., were funneling spare stocks into Westover as fast as they could get them.

▶**Assembly Call**—In New York, meanwhile, the Air Force assembled sheet-metal workers, hydraulic and propeller specialists, electricians and other servicemen, and flew them to Frankfurt.

In Germany, the C-54 pilots found no easy missions. Templehof Airdrome, target of the airlift shuttle, is in the middle of Berlin. Enclosing it are buildings just high enough to cause concern to pilots attempting bad weather landings.

Unfamiliar with tricky techniques developed to land at Templehof, new pilots required instruction from those already on the run.

Westover has not yet processed any aircraft returning to the U. S. from the Berlin airlift project. It has finished the job—for the time being.

ICAO Openings

International Civil Aviation Organization wants applications from all its member states for several new openings in the Secretariat.

The positions, which will be filled from as many different countries as possible, are primarily for duty in Montreal. Candidates must have a working knowledge of either English, French or Spanish.

Applications may be directed to the Air Coordinating Committee, Department of Commerce Building, Washington, D. C. Deadline is Sept. 1, 1948.

1000 Fireflys

Fairey Co., Middlesex, England, will turn out its 1000th Firefly this month. The plane, a Mk. V version, is currently used by the British, Canadian, Netherland, and Australian navies.

FIRST PHOTO OF NEW CHANNEL WING

Using a new improved design of short-chord channel wing, Willard R. Custer, Hagerstown, Md., inventor, is conducting first flight tests on his second channel wing airplane at Hagerstown airport. Plane is powered with two 75-hp. Lycoming engines turning Sensenich variable pitch propellers. Propellers mounted at rear of channels draw air through the channels to create lift. First flight tests demonstrate high lift possible with the device. More extensive demonstrations will follow after the aircraft fuselage has been covered and streamlined. First channel wing aircraft was demonstrated at Beltsville, Md., in 1943.

George W. Lewis of NACA Dies

Director of aeronautical research for 25 years, he planned the agency's rise to its present leadership.

Dr. George William Lewis, 66, for 25 years director of aeronautical research for the National Advisory Committee for Aeronautics, died at his summer home at Lake Winola, Pa. He was serving as research consultant to the committee at his death, having retired from direction of NACA research in August, 1947, because of failing health. Dr. Hugh Latimer Dryden succeeded him as director at that time.

▶**Unknown to Public**—Due to an almost militantly retiring nature, Dr. Lewis' outstanding achievements in aeronautical science enjoyed acclaim only in technical aviation circles. He was little known to the public. However, his contributions to scientific aeronautical knowledge throughout the world in fundamental research are of historic importance.

Dr. Lewis was born in Ithaca, N. Y., in 1882. He was graduated from Cornell University in 1908 with a mechanical engineer degree and received a master of mechanical engineering degree in 1910 from the same institution. He held honorary degrees of Doctor of Science from Norwich University and Doctor of Engineering from the University of Illinois.

▶**Since 1919**—Dr. Lewis joined NACA at Langley Field in 1919 as a powerplant engineer and was appointed executive officer in November of that year. He was named director in 1924, a post he held until his retirement.

Under his planning, NACA grew from 43 employes to its current 6000, from one wind tunnel to three major research laboratories and two special research stations, from an original plant worth $5000 to its current valuation of over $90,000,000.

▶**Achievements**—Dr. Lewis supervised development of special research equipment unique in the world, including the first variable-density, full-scale, gust, free-flight and refrigerated wind tunnels. He personally directed the planning and construction of the Aircraft Flight Propulsion Research Laboratory, Cleveland, Ohio, which NACA will shortly re-name the Lewis Memorial Laboratory in his honor.

Dr. Lewis was a member of the committee of judges, Daniel Guggenheim safe aircraft competition (1927-29); member board of judges, Wright medal award (1928-30); member board of award, Manly memorial medal (1929-30); president, American Society of Mechanical Engineers (1929); winner of Guggenheim medal (1936); plenipotentiary delegate, Interamerican Technical Aviation Conference, Lima, Peru (1937); member board of directors, National Air Races of Cleveland (1938); president, Daniel Guggenheim Medal Fund, Inc. (1938-39); president, Institute of the Aeronautical Sciences (1939); delivered Wilbur Wright memorial lecture, Royal Aeronautical Society (1939); member, U. S. commission, Permanent American Aeronautical Commission (1941); award Spirit of St. Louis gold medal (1944); elected member, National Academy of Science (1945); received medal of merit for outstanding civilian contribution during World War II (1948). He was a member of the National Inventors Council and numerous professional societies.

Dr. George William Lewis

USAF Research

Extra appropriation makes possible special development projects.

Air Force is moving into high gear on a number of special research and development projects considered necessary to implement its tactical plans. A special additional appropriation of $48,215,000 was provided for these projects. They are in addition to the continuing research and development program of the Air Force and include:

▶**Experimental Aircraft**—$17,219,000 for work on range-extension projects on fighter aircraft, improved fire-control equipment for fighter planes, work on the track landing gear as applied to the Boeing B-50 and B-50C, improved fire-control equipment for the Boeing XB-47, dual-rotation propellers for the turboprops in the long-range Boeing XB-52 bomber, work on catapults to cut down on the distance that is required for takeoff and starting gear for jet engines.

▶**Guided Missiles** — $2,978,000 for work on supersonic turbojet engines, increased emphasis on the anti-V-2 guided missiles project and acceleration of development work on remote control guidance systems.

▶**Power Plants**—$1,300,000 to accelerate the development of a type of turboprop engine that will be particularly applicable to long-range bombardment airplanes.

▶**Propellers**—$2,625,000 to accelerate development of hollow-steel and aluminum alloy blades and hubs for turboprop propellers.

▶**Armament**—$3,198,000 to accelerate the development of bomb hoist and handling equipment, bombing systems, fire-control systems and charting systems that are contained in fire-control devices.

▶**Photographic Equipment**—$698,000 for reconnaissance cameras and related equipment, mountings, illuminants and processing equipment for rapid development of aerial photographic negatives.

▶**Track Landing Gear**—$500,000 for the accelerated development of track landing gear in general and apart from specific installations.

▶**Electronics**—$5,955,000 to accelerate the development of approach and landing systems, including GCA, glide path calculators and similar aircraft-control electronic equipment. Of this total $215,000 is for development work on UHF communications systems. Increased emphasis will be placed on navigational systems and instruments including universal beacons and unattended beacons. Research into countermeasures to be used against radar will be accelerated.

▶**Test Equipment** — $6,409,000 is scheduled for the purchase of improved test equipment for Wright-Patterson Air Force Base, Muroc Air Force Base and Alamogordo, N. M.

▶**Geophysical Research** — $1,785,000 for upper air research including the outer atmosphere probed by research missiles. This research is intended to develop atmospheric forecasting formulae important to the operation, control and navigation of future missiles and the improvement of meteorological techniques.

Unspecified projects account for the balance of the special appropriation sum.

New Laws

President signs eight aviation measures, lets dirigible proposal die.

Eight aviation measures sped through Congress in its closing hours have been signed by the President and are now law.

The President's pocket veto of legislation directing the Maritime Commission to draw up plans for a research and development program of rigid lighter-than-air ships for commercial use reportedly was due primarily to Maritime Commission reluctance to undertake the project.

Aviation measures signed by the President were:

▶**Airline Financing**—The two measures to facilitate airline financing of new equipment were vigorously urged by Air Transport Association. One authorizes CAA to record liens on aircraft equipment and "basket" liens on aircraft parts. This will give them legal status and open the way for part-cash purchases of engines and parts. CAA is already authorized to record liens on aircraft. ATA's Executive Vice President Robert Ramspeck reported that engines and parts now account for approximately 25 percent of the cost of new fleet purchases, and that legalizing part-cash purchases of the auxiliaries will measurably aid financially hard-pressed air carriers in acquiring new equipment.

The other measure removes banks and others financing new aircraft purchases from liability for accidents involving the aircraft. Financial concerns in the past have been reluctant to finance new plane purchases because in over a dozen states the name-owner has been held equally liable with the operator-owner for aircraft accidents.

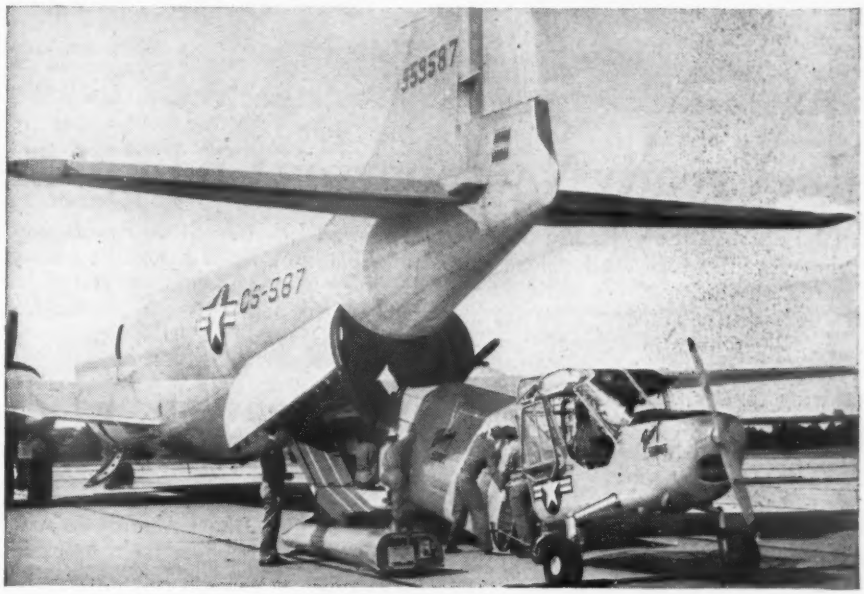
▶**Thunderstorms** – The legislation directs the Weather Bureau to make a comprehensive study of thunderstorm phenomena with a view to promoting air safety.

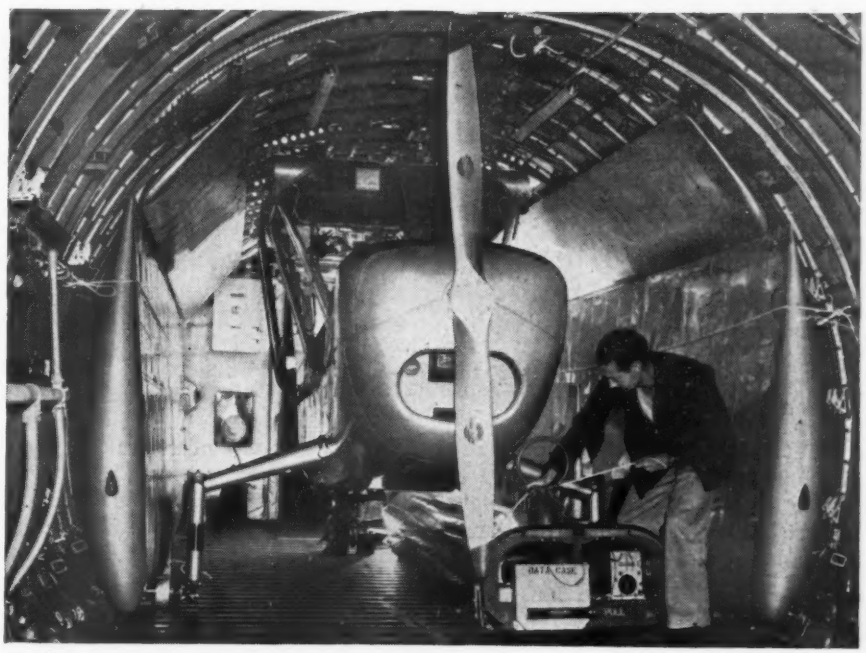
▶**Overseas Facilities** – The measure gives CAA sweeping authority to purchase, construct, and operate airports and navigation facilities around the world, and to train foreign nationals in their operation, with a view to promoting U. S. overseas air transport. Appropriations would have to be obtained from Congress before projects could be undertaken, however. CAA is authorized to "make just and reasonable charges for aeronautical services (including but not limited to landing fees . . .)" The immediate result of the legislation will be to open the way for CAA to take over operation of military installations built abroad during the war.

▶**Domestic Airways** – The measure, aimed at furthering the domestic air navigation facilities program, authorizes CAA to acquire (using condemnation powers, if necessary), improve, and operate facilities, both on and off the federal airways. CAA, now limited to operating facilities on the airways, is blocked in its plans to blanket the country with omnidirectional high-frequency radio range installations. USAF's request for veto power over installations was rejected by Congress.

▶**Ocean, Loran Stations**—One measure authorizes the Coast Guard to establish and another measure to operate and maintain ocean stations and Loran stations for air commerce. Coast Guard is authorized to establish Loran stations at the direction of the CAA administrator, but could only establish ocean station required by the national defense.

▶**Air Traffic Control** – CAA is authorized to train government and civilian personnel for air traffic control.





BOEING SCOUT GETS A LIFT

Army Ground Forces' L-15 liaison plane can be broken down for airlift and loaded aboard a plane in less than an hour by a five-man crew. Unloading and reassembly take about the same time. Top, the crew prepares to load the disassembled Scout aboard a Boeing C-97 Stratofreighter. Lower photo shows parts of plane being secured against shifting about inside the upper cargo deck of the C-97.

MacCready New Soaring Champion

Paul B. MacCready, jr., San Marino, Calif., won the 15th National Soaring Contest at Elmira, N. Y., with a total of 1042 points. He flew a 10-year-old Orlik Glider built in Poland.

The 22-year-old MacCready who is studying for his Ph.D. degree at California Institute of Technology made the longest single flight of the twelve-day meet, a 222-mile trip to Middlefield, Ohio, near Cleveland. It also was the longest flight made from Harris Hill at Elmira since 1941.

John Robinson, Pasadena, three times national champion, placed second in his familiar high performance glider, Zanonia, with 943 points, including a flight that carried him 178 miles to New Midway, Md., as his best effort of the contest.

MacCready made most of his points in his first five flights, all of them 140 miles or more in length. Included were a 145-mi. trip to York, Pa.; 167-mi. "goal" flight to Trenton, N. J.; 141 mi. to Fultonville, N. Y.; 143 mi. to Stone Ridge, N. Y.; and the 222-mi. flight to Middlefield, Ohio.

The victory won about $1500 for MacCready in prizes, including the $500 Bendix award for the best flight of the contest.

The meet was hailed as the biggest and best soaring contest ever held at Elmira, with the largest field of pilots, 70; the greatest number of sailplanes, 50; and the most prize money, $12,500.

Others of the first ten, in order of points totted up:

Don Pollard, Roanoke, Va., piloting the French Air-100; Ray Parker, Twenty-Nine Palms, Calif., in the Rigid Midget; Bull Coverdale, Chattanooga, in the Minimoa; Fritz Compton, Miami, in a Laister-Kauffman LK-10A; Fritz Sebek, Homestead, Fla., also in an LK-10A; Steve Bennis, Sanford, Fla., in a Kirby Kite; Lyle Maxey, Detroit, in the Minimoa; and Dick Comey, Weston, Mass., in a Schweizer 1-21.

NAA Convention OK's Revival Try

About 150 members and delegates to the 26th National Aeronautic Association convention met in Minneapolis to attempt to redesign the organization and give it new lease on life.

The convention opened on a note of gloom over the future of NAA, whose treasury is low and whose 73 chapters in 28 states have a total membership below 10,000.

"NAA cannot go on as it is today," L. Welch Pogue, chairman of NAA's board of directors, told the convention. "Its back is broken. You've got to do something about it now."

▶ **Two-Fold Activity**—He pointed out to the delegates and members that NAA has two levels of activity: national and local. "NAA does a tremendous job nationally," said Pogue, "all out of proportion to its local support. I doubt whether we can continue our national activities without more local support."

▶ **Revitalizing Program** – The convention delegates—especially the resolutions committee—turned their collective efforts to the business of revamping and revitalizing NAA. Results appeared in 16 resolutions approved unanimously.

Resolutions were passed to further NAA as a service organization. Charles H. Banning, president of the Greater Twin Cities chapter, host to the convention, pictured such service as including weather information, arrangement of transportation to and from airports, reservation of hotel accommodations, and other assistance to air travelers. Another resolution would foster more NAA activity in local communities and seek to boost membership.

▶ **Public Education**—The delegates also "resolved that the work of NAA chapters be increasingly directed toward public aviation education and coordination activity." It proposed to strengthen NAA's national education work and work more closely with other aviation groups.

Pogue suggested that NAA and AOPA ought to be affiliated.

To help refurbish NAA's treasury, the convention asked the board to consider establishing special memberships for "fellows" at an annual membership fee above the regular fee for chapter members. Feasibility of continuing the publication of NAA's organ, National Aeronautics and Flight Plan, will be studied.

▶ **Officers**—In the closing session, Louis E. Leverone, Chicago, president of Canteen Food Services, Inc., was elected president of the association. He succeeds Arthur I. Boreman of Des Moines. Other officers: executive vice president, Robert M. Phelps, NAA manager in Washington; secretary, Mrs. William Brown, Akron, Ohio; assistant treasurer, Mae Simpson, Washington, D. C.; first vice president, Edward Sweeney, Northwestern University, Chicago; second vice president, Fred Crawford, president of Thompson Products, Inc., Cleveland; vice president—air safety, Jerome Lederer, president, Flight Safety Foundation, New York City; vice president—air transport, Robert Ramspeck, executive vice president ATA, Washington, D. C.; vice president—air youth, Dr. E. N. Angus, Oaklyn, N. J.; vice president—airports, Col. D. H. (Al) Near, manager of Louisville, Ky., municipal airport.

Renegotiation Upheld

Constitutionality of the second renegotiation act (1944) has been upheld by the U. S. Supreme Court.

All military aircraft procurement for fiscal 1949 is subject to provisions of the renegotiation act. This applies to all aircraft prime and subcontractors on single contracts of more than $100,000.

Supreme Court test was solely on the constitutionality of the act and did not involve any judicial review of profit determinations made under the act. The court also ruled that a company that failed to apply to a U. S. tax court for a re-determination of the amount of excess profits the government sought to recapture under the act could not seek to do so elsewhere in the federal court system.

Multi-Purpose Baby Jet

A small pulse-jet engine claimed by its manufacturer to be suitable for a variety of uses has been announced by Aeromarine Co., Vandalia, Ohio.

Using automobile grade gasoline, static thrust is rated at 30 lb. Weight is 8.75 lb., maximum diameter 6⅝ in. and overall length, 51 in.

The engine has been tested as the powerplant on a motorbike (for this use a vibrator coil and cylinder of compressed air are engine accessories for starting). But the company sees it as a laboratory research tool and possible standby powerplant for gliders and thinks it may be suitable for blade tip installation on small helicopters.

AVIATION CALENDAR

July 16-24—Airport construction equipment display, American Road Builders Association, Soldiers Field, Chicago.
July 19-31—International Sailplane Contest, Samaden, Switzerland, open to U. S. contestants through National Aeronautic Association.
July 22—AIA Personal Aircraft Council Meeting, Detroit, Mich.
July 23-24-25—All-Ohio Air Tour, Cleveland, Ohio.
July 23, 24, 25—Midwest Soaring Contest, Toledo, Ohio.
July 24-25—Air Force Association, California state convention, Santa Monica.
July 24-Aug. 1—Southwestern Soaring Contest, Grand Prairie, Tex.
July 26-27—California Aviation Trades Assn. annual state convention, San Diego, Calif.
July 29—Alabama Flying Farmers organization meeting, Polytechnic Institute, Auburn.
July 30-Aug. 1—Cleveland Junior Chamber of Commerce Air Tour, Cleveland, Ohio.
July 31-Aug. 8—International Air Exposition, New York International Airport (Idlewild), N. Y.
Aug. 5-6—Statewide Aviation Forum, Peoria, Ill.
Aug. 18-20—Society of Automotive Engineers, West Coast meeting, St. Francis Hotel, San Francisco.
Aug. 24—ICAO African-Indian Ocean regional air navigation meeting, Seattle.
Aug. 26-27—International Wakefield Trophy Model Airplane Meet, Akron, Ohio.
Sept. 4-6—National Air Races, Cleveland.
Sept. 5-11—Seventh International Congress of Applied Mechanics, Imperial College of Science and Technology, South Kensington, London, England.
Sept. 7-12—SBAC aircraft show and display, Farnborough, England.
Sept. 9—IATA legal committee, Brussels.
Sept. 13—IATA executive committee, Brussels.
Sept. 13-17—National Instrument Conference, Instrument Society of America, Convention Hall, Philadelphia.
Sept. 14-18—IATA fourth annual general meeting, Brussels.
Sept. 19-21—Twelfth International Convention, Northwest Aviation Planning Council, Vancouver, B. C.
Sept. 20—IATA executive committee, Brussels.
Oct. 6-8—National Association of State Aviation Officials, Copley Plaza, Boston.
Oct. 6-9—Society of Automotive Engineers aeronautic meeting, Biltmore Hotel, Los Angeles.
Oct. 14—Annual Air Line Dispatchers Association convention, Edgewater Beach Hotel, Chicago, Ill.
Oct. 15-24—International aircraft exhibit, Royal Danish Aeronautical Society, Copenhagen.

INDUSTRY OBSERVER

►Boeing Airplane Co. beat out twelve other airframe manufacturers in the latest USAF design competition for a long-range turboprop bomber. Boeing's entry has four turboprops and will be heavier and longer-ranging than the company's six-jet XB-47. New award to Boeing will not change USAF production plans for the B-47.

►Navy is planning an extensive six-month operational test program for its two Lockheed Constitution transports before rendering a final decision on whether the planes will remain in the Navy or be given to MATS. The 184,000-lb., 300-mph. planes will be operated by a special Navy detachment of six officers and 24 men commanded by Cmdr. William M. Collins, jr., former NATS squadron commander. Included in the test program will be a 5000-mile flight from the Pacific Coast to Guam.

►Howard Hughes may be expected to fly his giant flying boat again any time after Aug. 1. Since its first brief flight last fall the aircraft has undergone several control surface modifications. Taxi tests are scheduled to begin within two weeks.

►Gene May, Douglas test pilot, last week told a Los Angeles Chamber of Commerce aviation luncheon gathering that on one experimental run of the Douglas Skystreak last year, just prior to the airplane's world speed record flight, he was clocked at 701-2 mph. The flight was made within 50 ft. of the surface of Muroc dry lake. May said the plane "behaved perfectly" at that speed. This probably is the fastest, although unofficial, flight ever made near sea level. X-1 and F-86 supersonic flights were made at high altitudes. At a typical Muroc temperature of 90 deg. May would have reached a Mach number of .896. At standard temperature of 59 deg. it would be Mach .92.

►Piasecki XH-16, new Air Force helicopter, will be about twice the size and capacity of the Navy HRP-1 currently in service. The Air Force version will have 80-ft. diameter rotors and be capable of lifting a pay load of 6000 lb.

►Herbert H. Hoover, NACA research pilot, is the fourth NACA pilot to receive the Octave Chanute award administrated by the Institute of the Aeronautical Sciences. Other NACA award winners are Melvin N. Gough, William H. McAvoy and Lawrence A. Clousing. The award is made annually to a pilot who has made "outstanding contributions to aeronautical science."

►Sweptwing Boeing XB-47 Stratojet bomber has completed Phase I (company) tests and been turned over to the Air Force for Phase II (USAF) flight tests. Major Guy H. Townsend, pilot, and Capt. J. L. Ridley, copilot, will comprise the Air Force flight test crew for the Phase II program, which will continue at Moses Lake Air Force Base, Wash. No. 2 airplane has been completed and will undergo its first flight test in the next few days.

►Goodyear Aircraft Corp. has received preliminary notification of extensive subcontract work on major assemblies and sub-assemblies for aircraft under the fiscal 1949 procurement program. Work will include wheels, brakes, free-blown and roto-formed canopies, other aircraft components.

►Bristol Theseus turboprop, holder of first 150-hour type approval certificate of the British Air Ministry, has completed a 350-hr. type test during which it was operated at full throttle for three minutes each five hours. The Theseus turboprop has been in service for more than 18 months in an Avro Lincoln bomber.

►Extremely sensitive control features Rotor-Craft's experimental tandem helicopter XR-11 now under test for Army at Grand Central Airport, Glendale, Calif. Test pilot Knute Flint reports almost no discernible lag between application of control and response of craft. Transition flights will follow mounting of new rotor blades, now being balanced.

Beech Sales

Company averages about $2 million a month for first three quarters.

Beech Aircraft Corp. has been averaging about $2 million worth of sales a month for the first nine months of its 1948 fiscal year, with total sales of $18 million for the period.

A breakdown of these sales indicates that approximately 54 percent of the dollar value was contributed by commercial type planes and spare parts, including foreign sales. Commercial volume mainly consists of new Model 18 all-metal twin-engine Beechcrafts for executive and corporation use, including some sales to foreign lines, and new Beechcraft Bonanza four-place all-metal executive aircraft. Spare parts constitute about 15 percent of commercial sales.

▶ **Military**—Military contracts amounted to about 46 percent of the sales volume, and consisted for the most part of aircraft overhauls for the U. S. government, and spare parts.

No accurate count is available as to the number of Beechcrafts in use today. This is due to the delivery of many such planes to foreign countries in connection with foreign aid programs and as a result of surplus sales after the war.

▶ **Spare Parts Importance**—Beech management, however, estimates that there are approximately 6000 Beechcrafts in current use, either in the hands of United States and foreign governments or commercial users. This quantity of aircraft requires a large volume of spare parts manufacture on a continuing basis in order to insure proper maintenance, and indicates the importance of the spare parts contribution to Beech sales volumes.

Of the total volume of sales for the first nine months of the present fiscal year, more than 15 percent was due to export deliveries. Considering commercial sales alone, including complete aircraft and spare parts, export sales constitute the amazingly high percentage of 28.4 percent of the total commercial bookings.

Confirmed export orders are reported to be at an "all-time high level" despite the current difficulty of obtaining allocation of dollar funds from foreign countries. No export order is considered firm until the entire purchase price is covered by an irrevocable letter of credit.

▶ **Twin Quad**—The management reports that considerable interest is being shown by domestic and foreign airlines along with the U. S. military services in the new 20-passenger Twin-Quad Beechcraft transport which is being readied for Civil Aeronautics Administration certification tests. Routine company flight testing is reported to be proceeding favorably.

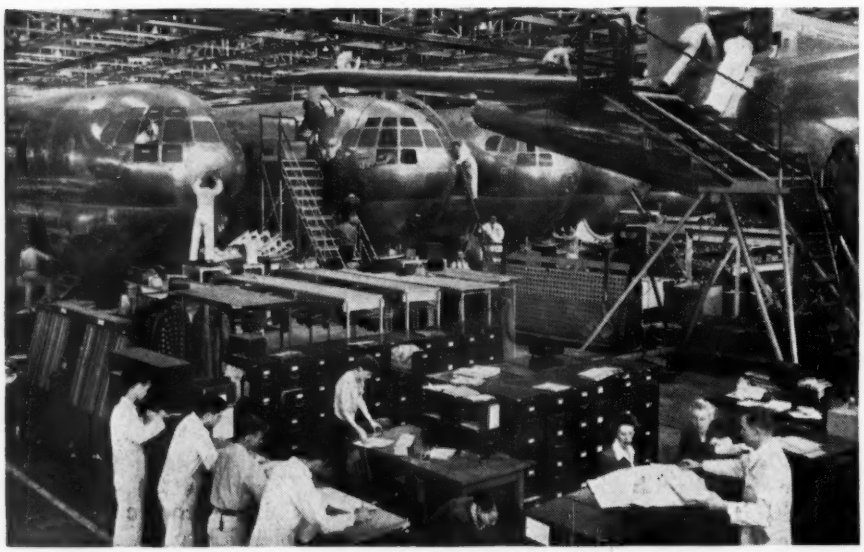
Designed for operation from small fields, with a projected minimum operational cost per seat mile, this new aircraft is expected by the Beech management to find wide market distribution. With this plane added to its list, the company will have its sales still further diversified.

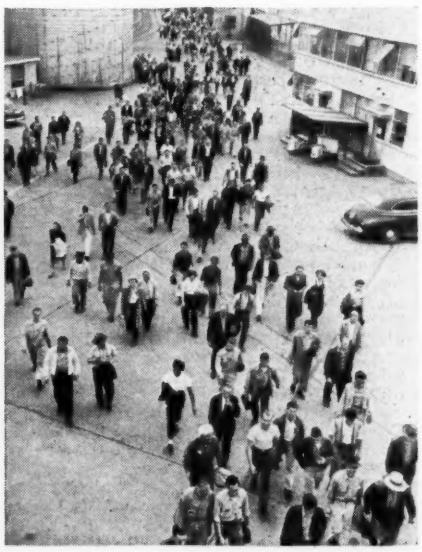
C-W to Call Stock?

Rising market prices for Curtiss-Wright Class "A" stock have given support to reports that the company soon may call for tenders at around $30 per share.

Late last year the company invited tenders for 500,000 shares of Class "A" stock at $20.50 a share. Only 204,983 shares were offered and retired at a total cost of $4,205,000.

With the company winning its management fight against a group of dissident stockholders and holding about $60,000,000 in declared surplus working capital, it is believed further reductions in the outstanding capitalization will be attempted.





WORK FORCE GROWS AT BOEING WHILE STRIKE GOES ON

Although the Aeronautical Mechanics Union claims otherwise, the three-month-old strike at Boeing Airplane Co.'s Seattle plant appears to be losing its effectiveness as work resumes on Stratocruisers (left), and the 4 p.m. shift change (right) once more pours a small army of workers from the plant. With one shift now more than 65 percent manned, the company plans to start a second shift today. Employment last week totaled 8887, including 2217 returned strikers. In one recent three and one-half day period, according to personnel manager Les Isaacson, 1313 hourly workers were hired. Company says it is now within about 5000 of its goal of 10,000 hourly workers. This is 4000 hourly workers less than were needed before the strike, due, the company states, to stepped-up subcontracting that already has cut down needed workers by 1150.

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a high-strength quick-release safety belt

CAA PROPOSED IT! In Civil Air Regulation draft release 47.9, the CAA proposed more stringent requirements for safety belts, in accordance with findings of the Crash Injury Project of the National Research Council.

NAS ADOPTED IT!.. In NAS 802, the CAA proposal was adopted as a National Aircraft Standards Committee specification.

AOPA ENDORSED IT! The Aircraft Owners and Pilots Association, in its official organ, advocated compliance with the new requirements.

PAC HAS IT!..... The new Pacific Airmotive safety belt fully meets all requirements of the new safety code. *We believe it is the only belt commercially available today that can do so.*

NEW SAFETY BELT REQUIREMENTS

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- ★ 2-inch minimum width
- ★ flameproof and mildew-resistant

This Attractive PAC Safety Belt Available for All Private and Commercial Aircraft

The Pacific Airmotive belt has a highly finished, attractive buckle, and is supplied with wear-resistant webbing in any one of six colors: Wine, Evergreen, Beige, Autumn Brown, Bridgeport Grey, Windsor Blue.

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UNITED STATES STEEL

Vought Names New Executives

In preparation for its full-scale move from Stratford, Conn., to Dallas, Tex., Chance Vought Aircraft Division of United Aircraft Corp. is reshuffling its key executive posts.

Frederick O. Detweiler, former divisional controller of the Sikorsky Division, has been made assistant general manager of CV's new Dallas plant. Detweiler, who joined United Aircraft in 1933 as time keeper of the Pratt & Whitney Aircraft Division, will be assisted by James J. Gaffney, former CV divisional controller.

Gaffney's association with CV dates from 1929, when he joined the company as assistant treasurer. His former post will be filled by Newton V. Turney, who, since 1946, has been CV's divisional accountant.

Clifford E. Burt, former assistant to the controller of United Aircraft Corp., succeeds Turney.

▶ **In other personnel developments:**

Bendix Aviation Corp., Pacific Division, named R. G. Hoof sales manager. Hoof, who has been with the Pacific division since 1939, was formerly with Douglas Aircraft Co.

The Garrett Corp. appointed Col. James M. Gillespie, former chief of the Air Force All-Weather Flying Division, assistant and technical advisor to the president. Gillespie, whose USAF retirement dates from May 26, will devote most of his time to the GAI Research division.

General Electric Co. elected R. I. Parker commercial vice president to succeed W. O. Batchelder, resigned. Parker has been associated with the company since 1912, when he joined G.E. as a student engineer on the test course at Schenectady.

Goodyear Tire and Rubber Co. named J. E. Wells sales engineer in the aviation products division. He will report to C. O. Bell, manager of the landing gear and flight operations department. C. B. Householder has been appointed manager of the fuel tank department. Householder, former sales enginer for eastern U. S., is succeeded in this position by E. M. Humphrey of the New York office. Humphrey will be replaced by W. A. Carlson, who leaves the aviation products office in Miami. M. R. Price, Akron staff man, will take over Carlson's job in Miami.

Jack & Heintz Precision Industries, Inc., elected J. Louis Reynolds, former manager of the aviation division, vice president of the company. Reynolds was with the Eclipse-Pioneer division, Bendix Aviation Corp., prior to joining J&H in 1946.

Piasecki Helicopter Corp. named W. R. Frysztacki vice president-administrative and William F. Palmer treasurer and controller. Frysztacki retains his post as secretary-treasurer of the company. Palmer was formerly assistant comptroller of Glenn L. Martin Co., and secretary-treasurer of the Luscombe Airplane Corp.

Raymond Rosen & Co., Radio Engineering Products Division appointed Martin Kiebert, Jr. to its telemetering staff. Kiebert, who will be responsible for the enginering, design and sale of telemetering equipment, gained experience in this field in the Navy.

Vickers Inc. named Walter L. Flinn application and sales engineer, succeeding Philip H. Emrich, recently appointed service manager for all Vickers hydraulic products.

United Aircraft Products, Inc., elected Ira M. Grishaver vice president. Grishaver, who will continue as secretary of the company, is also treasurer-secretary of the Metal Production Corp.

Monsanto Chemical Co. appointed G. Theodore Barks general superintendent of its vinyl chloride production unit. Barks has been division superintendent of U. S. Rubber's Fisk plant.

Pacific Airmotive Corp. made Richard Maystead head of the company's equipment sales group.

Westinghouse Aviation Gas Turbine Division appointed Romus Soucek, formerly with Consolidated Vultee Aircraft Corp., sales manager. . . . Ralph R. Brady has been named manager of commercial engineering for the Westinghouse Lamp Division.

Handley-Page Buys Miles Aircraft Co.

(*McGraw-Hill World News*)

LONDON—After long and tortuous legal proceedings, the bankrupt Miles Aircraft Co., of Reading, will soon emerge from receivership shorn of its aircraft business and drastically reduced as to capital.

Handley-Page Ltd. has agreed to purchase the principal aircraft assets of Miles at a price reported to be well above what they would bring at a forced sale. These assets include the Marathon, a postwar design of feeder-transport plane (50 of which have been ordered by the Ministry of Supply for British European Airways), the repair and servicing of other types of Miles aircraft still flying, and the flying school at the Miles' Woodley factory (Reading).

These activities will be acquired and carried on by a wholly owned Handley-Page subsidiary.

▶ **Marathons to Go On**—New contracts will, of course, have to be arranged by this subsidiary with the Ministry of Supply, and a portion of the Miles' factory at Woodley has been leased in which to continue the production of Marathons.

The Handley-Page commitment, however, is conditional upon the acceptance by Miles stockholders and creditors of a new plan which would write-down the existing capital from £10,000,000 ($4,000,000) to only £70,000 ($280,000).

This latest proposal has been prepared by S. R. Hogg, the receiver appointed last fall at the urging of the debenture holders in order to stave off compulsory liquidation of the company as asked by Titanine Ltd., one of the principal creditors.

The write-down was approved this week by the Chancery Court and is expected to be agreed to by other interested parties.

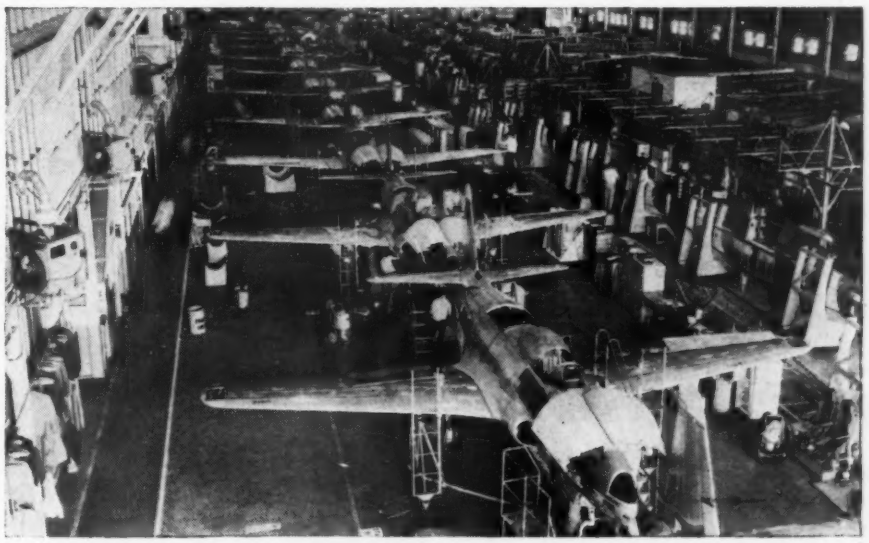
Domestic Plane Boost

McGraw-Hill World News

MELBOURNE—Government-owned airlines in the future will use Australian-built planes on feeder services.

An order has been placed with de Havilland's branch plant at Sydney for twelve three-engined Drovers. Trans-Australian Airlines will use six. Four will be commissioned by Qantas Empire Airways, mainly for use in New Guinea. The other two will be operated for various purposes by the Department of Civil Aviation.

De Havilland has an eye on the export trade after demand for the plane in Australia has been met.



F-80 PRODUCTION LINE

F-80 "Shooting Stars," which led the list of planes ordered recently by the Air Force, are shown on Lockheed Aircraft Co.'s production line. New Air Force order for 585 F-80s calls for 457 standard models and 128 two-seat F-80 tandems. This and existing orders will carry production to the middle of next year. Planes are being delivered at the rate of one a day from the Burbank, Calif., plant.

P-80 Still 'Right' After Five Years

Original design modified slightly, but aerodynamic shape unchanged through 100,000 hours of flying.

By Robert McLarren

First U. S. jet aircraft to be ordered for quantity production, the Lockheed P-80 represents something of a phenomenon in modern aircraft engineering history.

Not only was it designed, built and flown in remarkably short time but it has undergone, in five years, a minimum of modification from its original production form, none in aerodynamic shape.

That its original layout, hurried though it was, continues "right" after some 100,000 hr. of flying is a unique tribute to Clarence L. 'Kelly" Johnson, Lockheed's chief research engineer, and his small project staff.

▶**Early Interest**—Lockheed became interested in the possibilities of jet propulsion as early as 1939 and completed preliminary design studies of a radical fighter to be powered by a Lockheed jet engine, then under study.

In the spring of 1941 the project had progressed far enough to permit submission of a formal design proposal to Wright Field.

However, the (then) Materiel Division was much more interested in development of the P-38, then in quantity production, and urged the company to concentrate on this type, a decision which later events proved sound with the twin-boom fighter playing its historic role in World War II.

It was while watching a demonstration of the new P-38J model at Eglin Field, Fla. on June 17, 1943 that Col. M. S. Roth, Materiel Division, informed Johnson of the successful flight test program on the Bell XP-59A, first U. S. Jet aircraft, but with performance representing little improvement over the P-38 and other propeller-driven types in combat.

Roth revealed that the Materiel Division was interested in a new and improved design and asked Johnson to "try his hand" at it.

On his way back to Burbank, Johnson began preliminary sketches. These were drawn in detail at the plant, submitted to Wright Field, and on June 23 (just six days later) Army Air Force approval had been obtained—but with the proviso that the airplane had to be ready within 180 days.

▶**Project's Beginning** — With carte blanche from Hall L. Hibbard, v.-p. in charge of engineering, Johnson assembled a key staff for the project—E. D. Palmer, engineering special projects; W. P. Ralston, project engineer; and A. M. Viereck, experimental engineering manager and his assistant L. F. Holt.

A building was assembled from packing cases and canvas, and the XP-80 project began with 23 engineers and 105 shop men working day and night. On the 19th day the mockup was completed, 132nd day the engine arrived, 139th day the engine was run, and on the 143rd day the airplane was ready for flight tests.

▶**British Engine**—This original airplane was powered by a de Havilland H.1, designed by Frank B. Halford of the de Havilland Engine Co., Ltd. It was rated at a maximum static sea-level thrust of 2500 lb. and was the first jet engine to use a single-sided impeller and straight-through combustion chamber.

It had already been test flown in the prototype Gloster Meteor in the first flight of that plane March 5, 1943. The XP-80 was taken to Muroc Dry Lake, then a secret experimental center. During a ground test of the engine the suction of the compressor, unrelieved by ram, collapsed the air intake ducts and damaged the engine.

It was not until Jan. 8, 1944 that a new engine had been installed and the XP-80 taken on its first test flight by the late Milo Burcham, Lockheed test pilot.

▶**Engine Changed**—It had become apparent that production of the de Havilland H.1 could not be accelerated to meet the needs of the P-80. General Electric had already gotten into quantity production on the I-40 (J-33), an improved version of the original Whittle engine incorporating straight-through combustion, replacing the reverse flow system of the Whittle W.1 engine. Engine change-over however, required redesign of the craft. The new prototype, the XP-80A, was two feet longer, two feet more in span, had a 25 percent increase in design weight, new intake ducts, revised landing gear, etc.

The new design was completed in 138 days and the plane flew for the first time at Muroc on June 10, 1944.

▶**Orders**—Production began immediately and five aircraft, including two prototype XP-80As were delivered during the year.

An initial order for 500 was placed by the Air Force and this was increased during the Spring of 1945 to a total commitment of 2584 airplanes. In addition, a contract for 1000 P80s was signed with North American Aviation to be built in its Kansas City plant.

By V-J Day, Lockheed had delivered more than 100 P-80As, some of which had been delivered to Air Force units in Italy and England for familiarization flights.

Fundamental Data
Lockheed F-80C

Power Plant	Allison J-33-A-23
Span	38 ft. 10½ in.
Length	34 ft. 9½ in.
Height	11 ft. 4 in.
Weight (empty)	8000 lb.
(max. gross)	14,000 lb.
Max. speed (sea level)	600 mph.
Ceiling (service)	46,000 ft.
Range (normal)	1900 mi.

Check THESE *new* REASONS WHY SIMMONDS PACITOR (REGISTERED) CONTENTS GAUGES *lead the field*

Because of many design advantages, Simmonds Pacitor Contents Gauges lead the field in their acceptance by engineers, maintenance crews and operators.

Now, Simmonds presents a new Pacitor gauge with five additional advantages.

Simmonds Pacitor gauges are standard equipment on newest types of transport and military aircraft.

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Aeromatic® out-performs them all in split-second emergencies . . .

Four Lives **and a new ship were at stake . . . but the *automatic* action of the AEROMATIC Propeller gave pilot Faulkner split-second full power with flat pitch. Split-second, automatic pitch is what counts in emergencies . . . it counts in normal operations, too.**

POWER LINES cut his final approach at the last minute! The pilot, Mr. Edward Faulkner, president of Faulkner Aviation Industries, was really up against it! He had a full load, no wind and an air speed of only 60 MPH! Here's his own story of what happened . . .

"WHILE fully loaded and giving a demonstration, I was coming in to land on an unfamiliar runway. I did not notice the power lines until they were directly in front of me. My air speed was only 60 MPH . . . I applied full throttle at once, attempting to clear the lines, or force my way through them. Our landing gear was caught momentarily on the wires . . . but we ended up in a normal landing . . . as though nothing had happened. No one was hurt. The damage was negligible. We all agreed that a serious crash had been averted due to the rugged stability and safety factors of the Bellanca Cruisair and the fact that *the Aeromatic Propeller immediately went into flat pitch and allowed us instant full power.* I continued my demonstration with the same passengers and, as a result, obtained five orders for planes, *all to be equipped with Aeromatic Propellers.*"

¼ SHORTER TAKE-OFF: Automatically, with the engine at full throttle, Aeromatic Propeller assumes low pitch. Gets plane off ground quickly with full take-off power.

⅓ HIGHER RATE OF CLIMB: Automatically responds to natural forces. Increases pitch as air speed rises. Gets plane to cruising level fast, on minimum fuel.

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WRITE FOR INFORMATION: Whether you own or plan to buy a new plane, write today to your manufacturer or distributor and ask about *Aeromatic.* Or write for your free AEROMATIC booklet! Koppers Co., Inc., Aeromatic Propeller Dept., 237 Scott St., Baltimore 3, Md.

AEROMATICS are available for these planes . . . are being approved for other makes and models:

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GRUMMAN WIDGEON	CESSNA 120 & 140	FAIRCHILD 24

also available for numerous foreign models

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The propeller with a brain K KOPPERS *for your personal plane*

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On V-J Day, however, the North American order was cancelled and the Lockheed order cut back to 917 planes. This order has since been increased by 644 F-80Cs, 156 TF-80 two-seater trainers, and 50 TO-1 trainer versions for the Navy. These and prototype models total 1783 Shooting Star types.

▶**Air Intake Factors**—The P-80A pioneered the problem of jet intake boundary layer control. In the original plane, as ram air was slowed inside the air intakes, the boundary layer (adjacent to the fuselage) thickened, resulting in stalling of the flow and its now familiar ramifications of duct "rumble," uneven flow to the engine plenum chamber, flow fluctuations over the wing and resultant "snaking" and poor engine performance.

These complexities were resolved by the introduction of a boundary layer bleed duct, adjacent to the fuselage, which carries this low energy air away from the air inlets and exhausts it from louvers above and below the main air inlet.

As a result, pressure recovery of the ducts was increased to 70 percent of available adiabatic compression pressure. Although this is not an exceptionally high value, at high speed, chief improvement was in the recovery at low flow ratios, making air starts easier since the modified duct resulted in the windmilling at double the speed of the original installation.

The double-sided impeller of the I-40 engine takes in air on both front and aft faces. This system requires a plenum chamber installation at the forward part of the engine in which the entire compartment contains air under pressure. Air entering the aft face of the compressor flows around the engine and must make a 180-deg. turn to enter, resulting in large losses.

It is this installation that holds down efficiency of the P-80 and indicates that the axial-flow installation is superior.

▶**Tailpipe Details**—The P-80 had the same tailpipe problems that have plagued subsequent jet craft (AVIATION WEEK, May 24, 1948).

Although the J-33 engine is not as sensitive to variations in nozzle area as is the J-35 (TG-180) (about 100 lb. thrust loss per ⅛-in. variation in the J-33 compared to 135 lb. loss in J-35), Lockheed found that decreasing the nozzle area of the P-80 from 19 to 18½ in. improved the thrust 400 lb., increased tailpipe temperature 150 F. and provided consequent improvements in airplane performance.

Problem of aft fuselage deflection transmitting failing loads to the engine tailpipe was examined in a static test in which an 8000-lb. load was imposed on the horizontal tail. This load was vibrated to simulate buffeting. Although a fuselage deflection of two inches was created, no damage to the engine or tailpipe resulted.

Low internal pressures created inside a jet craft present unique problems. Collapse of the ducts on the XP-80 engine resulted in installation of two spring-loaded doors atop the fuselage aft of the canopy which permit outside air to enter the plenum chamber when the internal pressure falls below a given value.

These doors have proved completely satisfactory and have evidenced no tendency to flutter.

A similar pressure differential can exist with the tailpipe, particularly in event of an engine baffle seal failure, which would introduce high pressure air on the outside of the pipe through which low pressure air is flowing. Static tests indicated that a differential of seven inches of mercury could exist under this condition and the tailpipe has been designed to carry this load.

▶**Emergency Fuel**—Fuel system consists of both wing and fuselage tanks equipped with an automatically operated transfer system in which the wing tanks pump fuel into the fuselage tank. This system can be interrupted by a manual control arrangement. Instrument panel lights indicate empty tanks.

Wing tip fuel tanks are pressurized by a bleed line from the engine compressor.

The basic fuel system contains an emergency system which operates automatically when the main system pressure falls below a preset value.

The emergency arrangement consists of an electrically-driven fuel pump in a line connected between the tank and the throttle. This permits fuel to bypass the engine-driven pump, the governor and the barometric control, any one of which may malfunction. Numerous P-80s have already been saved by the use of this emergency fuel system and it has since become a standard requirement for jet aircraft.

▶**Water Injection Used**—The P-80 was the first jet craft to experiment with water injection, and thrust increase as high as 30 percent of static has been attained with water flow rates of 25 gpm.

Water injection increased engine pressure ratio about 8 percent, tailpipe temperature about 5 percent, and reduced the temperature rise through the compressor by two-thirds.

These effects reduced the takeoff run to clear a 50-ft. obstacle to 70 percent of the distance required without water injection.

Although these gains are considerable, water injection introduced a series of practical problems in the P-80 which have not yet been satisfactorily overcome.

In addition to wing tip tanks, the cabin pressurization system and flight instruments are also operated by pressure bled from the engine compressor. When water is injected into the compressor, the cabin, instruments, and tip tanks are water-sprayed.

To obviate this condition, water injection is used on the P-80 only when the cabin pressure, flight instruments and tip tanks are rendered inoperative by shutting off the air bleed from the compressor. Design work on this condition is being pressed.

▶**Tip Tank Study**—Location of the jettisonable wing tip tanks on the P-80—originally its distinctive feature—was decided after extensive wind tunnel tests of eight different installations, including the P-38 pylon-mounted type, the slipper type (utilizing a fairing under the wing) and a series of spanwise positions.

Final installation, at the extreme tip, was simply because tank drag was least in this position, actually only 12 percent increase in drag as compared to a 27 percent increase for the P-38 type and a 30 percent increase for the slipper type.

Further investigations revealed numerous other advantages of the extreme tip installation:

The tank provides an end plate effect (greatly reduced vortex flow) increasing the effective aspect ratio of the wing from its geometric value of 5.5 to an effective value of 9.9.

This actually decreases the drag of the wing. In tests from 40,000 ft., the P-80 glided 87 mi. without the tanks and 92 mi. with tanks installed.

The tip location has a minimum adverse effect on wing critical Mach number, the plane having been flown to Mach 0.75 with tip tanks installed.

Structural strength of the wing is actually increased through the dead weight effect of the fuel.

Aileron effectiveness is increased, which compensates for the loss of effective dihedral resulting from the installation.

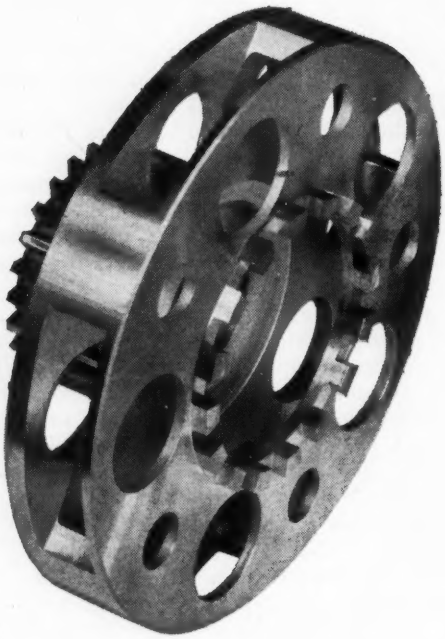
Two size tanks can be fitted, the standard 160-gal. type and special 330-gal. long-range tanks used in establishing the present 4-hr., 13-min., 26-sec., West-East transcontinental record by Col. W. H. Councill, an average speed of 581 mph. These large tanks weigh 2500 lb. complete with fuel.

▶**Cable Tension**—One of the major problems of high-speed aircraft control was revealed on the P-80 but is common to all types of the same high performance.

The aileron system is fitted with a conventional hydraulic booster of the type used on the P-38 and provides a ratio of 15:1 between control movement and pilot effort. With this ratio

Years and years of

PRECISION GEARS



It has been a long time between gears . . . our first ones in 1902, and the gears* scheduled in our plant today. Between these gears lie the years of experience which are needed to produce the finest in precision gears.

***Shown here is an intricate planetary cage on which a ten-thousandth tolerance must be maintained, and where slight warpage in carbonizing and hardening would be disastrous.**

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a rate-of-roll of 150 deg./sec. is obtained at intermediate altitudes at an indicated speed of 300 mph. Boost ratios as high as 28:1 have been tested and produced phenomenal rates of roll; however, these are not considered necessary.

One problem created by the boost system is the continuance of this high rate-of-roll at high altitudes, resulting in overcontrol at 30,000 ft. and above. Air Force pilots believe that some method of compensating this boost system for altitude would be highly desirable since pilot effectiveness is decreased in combat involving wide variations in altitude, if the pilot has to remember the variation in aileron effectiveness with altitude.

Aileron cables are ⅜-in.-dia. Metalclad, but in spite of very high preloading and precautions taken to reduce system deflection, only about 50 percent aileron displacement is available at high speeds. The preloading resulted from the occurrence of aileron "buzz" on early models of the P-80. This condition is created by flow fluctuations (often caused by shock wave formations forward of the aileron) over the upper and lower surface of the aileron, in a manner to force a high-frequency vibration with an amplitude of about ½ in. at Mach 0.80 and a violent oscillation through large amplitudes at speeds higher than this.

After extensive tunnel tests at the NACA-Ames Aeronautical Laboratory, Moffett Field, Calif., it was revealed that increased control cable tension was the only expedient answer to the problem. Lockheed increased cable tension to 350 lb., an inordinately high value, at sea level to insure that a tension of more than 50 lb. is available at 30,000 ft.

► **Armament, Equipment** – Combat equipment aboard the P-80 affords a wide range of missions. Armament includes six .50-cal. machine guns located on the nose, and special cluster fittings accommodating 10 rockets. Wing tip tank fittings can carry two 1000-lb. bombs.

A photographic version, **the FP-80,** features a special nose containing clear-glass panels and provisions for a variety of cameras including the standard trimetregon type.

Two 1000-lb.-thrust JATO units may be fitted to the P-80 fuselage to reduce takeoff run 30 percent.

Radio-controlled drone P-80s have been successfully tested and various systems of radio control developed by Bell Aircraft, Sperry and the Air Force are now undergoing study.

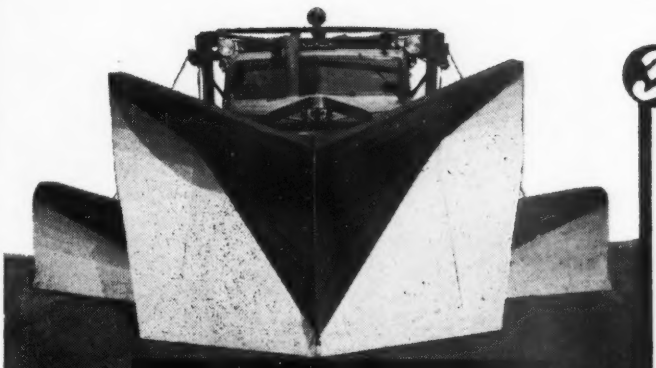
Fuselage dive-brakes, pilot ejection seat, cabin refrigeration equipment, and alcohol-water injection are standard equipment on current models.

Planning to buy Snow Removal Equipment?

...here are THREE SUGGESTIONS

1 ***Get the facts on Walter Snow Fighters*** before placing any orders. Learn the many exclusive features which make them the fastest, most thorough snow removal equipment—capable of staying ahead of any storm and keeping runways open under all conditions.

2 ***Write us for detailed literature*** fully explaining Walter 4-Point Positive Drive—automatic locking differentials—suspended double reduction drive and other advances which provide super traction and high speed clearance, without slipping or stalling.



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3

PLACE YOUR ORDER *NOW!* The peak demand for Walter Snow Fighters is just ahead. Let us schedule production and assure delivery of your units before snow-time. It takes time to build carefully-engineered Walter Snow Fighters, hydraulic controls, bodies and plows. Act today.

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1001-19 IRVING AVENUE, RIDGEWOOD 27, QUEENS, LONG ISLAND, NEW YORK

THE PACKET

Carries Its Own "FLYING RUNWAY"

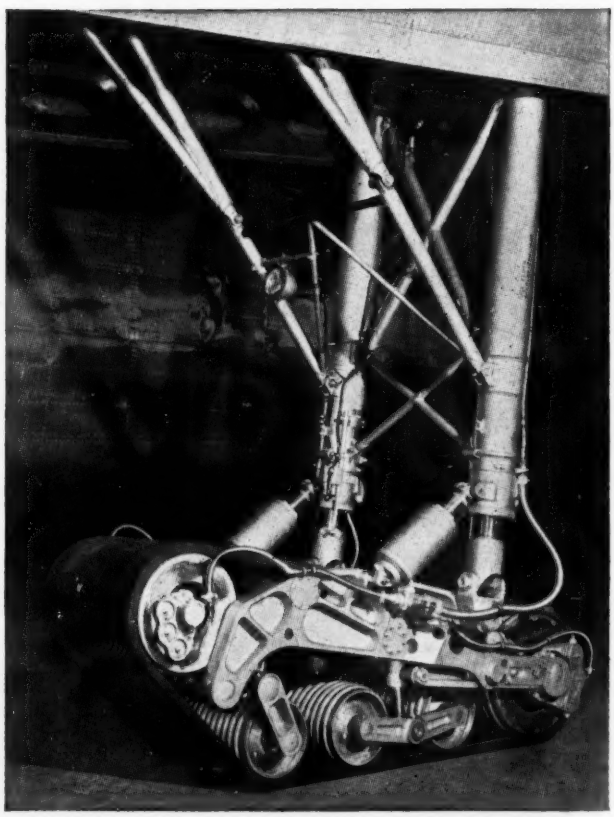
Engineering ingenuity has again added new usefulness to the Army's versatile flying boxcar, the Fairchild Packet.

The Packet, standard troop and cargo carrier for our air-transportable Army, was originally designed to operate in and out of short, unimproved airstrips. Steadily refined since its inception, it can now accommodate some of the largest weapons, vehicles and equipment used by the standard infantry division.

Today, The Packet has even wider applications in modern military tactics. Engineers of the Fairchild Aircraft Division developed a track tread landing gear that looks and acts like the track of a tank or tractor.

The new gear spreads the weight of the landing aircraft, reducing the "footprint" pressure to one-third of that of the standard wheel gear. It reduces the need for surfaced runways. Thus equipped, a fleet of Packets can deliver a combat-ready force anywhere on reasonably level terrain.

Fairchild engineers, with their experience and ingenuity, have again provided a new basic ability in the fast developing techniques of modern military strategy.



Fairchild Aircraft

Division of Fairchild Engine and Airplane Corporation, Hagerstown, Maryland

NEPA Now Engineering Problem

Chief engineer of Nuclear Energy for Propulsion of Aircraft project cites high performance and long range.

Development of atomic power—for aircraft as well as other installations—is now predominantly an engineering problem.

More is probably known about uranium fission than about basic mechanisms of combustion or supersonic aerodynamics.

These opinions were expressed recently by Andrew Kalitinsky, chief engineer of NEPA (Nuclear Energy for the Propulsion of Aircraft) Div., Fairchild Engine and Airplane Corp., at a press conference sponsored by the Society of Automotive Engineers, in New York City.

▶ **Potential Noted**—Holding that nuclear-energy-powered craft are realizable for flying non-stop to any point on the earth and return, Kalitinsky said that the main advantage of atomic propulsion for aircraft is the possibility of combining high performance and long range, since fuel supply would remain nearly constant.

In present-day craft, though high speed, large payload, or long range can be realized separately, a combination of these three factors is not attainable.

▶ **Shielding Considerations**—Crash danger, says Kalitinsky, would lie not in the reactor continuing to function but in the "ash"—products of fission already formed at the time of the crash.

Problem of protection against radiation damage is resolvable into two considerations—"shielding" and "canning."

Shielding is required to stop radiation originating within the reactor. Canning of the uranium blocks is necessary to prevent escape of the violently radioactive fission fragments into the reactor cooling system and to the outside, beyond the protection of the reactor shield.

First models of aircraft employing nuclear-energy plants will probably require extremely heavy shielding materials.

Shielding now under study is stated to be along lines of "plywood" construction—alternating the grains of the materials to aid in suppression of radioactive emanations.

▶ **Plane's Probable Features**—The very high speed atomic-powered plane is seen, initially, as being about as large as the mammoth B-36.

Its landing weight would be equal to takeoff weight, since practically no fuel would be used up in flight.

Crew positions would be located as far as possible from the power plant

Andrew Kalitinsky

and this would permit some weight-saving in the shielding.

Structure of the craft will differ somewhat from the conventional in that the "fuel" load would be concentrated at one spot—in the reactor at the craft's C.G., rather than widely distributed.

This feature is similar to that in our thin-winged, high-speed craft now under development, which do not utilize wing tanks.

Various basic types of power plants could be adapted to use atomic energy for aircraft propulsion.

▶ **Turbine**—One type of thermal power plant could be the closed cycle turbine—steam or mercury. Steam would be generated by heat in the reactor, which would serve to replace the boiler in a conventional arrangement.

The steam would expand through the turbine, which drives a propeller, and then condensed in an aircooled condenser. The supply would be forced back into the boiler-reactor by a feed pump. (Airplane speed, with such an arrangement, evidently would be limited.)

▶ **Turbojet**—In a turbojet power plant, the combustion chamber would be replaced by a nuclear reactor. Air would be passed through the compressor, and forced through the reactor, where it would be heated by convection instead of by combustion of fuel. It would then expand partially in the turbine, sufficiently to drive the compressor, and finally in the jet nozzle, where it would create the propulsive thrust.

▶ **Ramjet**—In the ramjet, air entering the diffuser and compressed by the forward speed of the plane, would pass through the nuclear reactor, be heated to high temperature, finally emerging through the exhaust nozzle where it would expand and acquire a high velocity, providing the propulsive thrust.

The ramjet becomes really effective at extreme speeds high in the supersonic regions. Air temperatures required are very high—considerably higher than those required in a turbojet.

The ramjet would be very sensitive to pressure drops caused by the internal flow resistance of the reactor or combustion chamber. Good heat transfer conditions must, however, be paid for by appreciable pressure drops. Hence, the ramjet application does not appear to be a simple problem.

▶ **Rocket**—In a rocket application, the propellant, for example, liquid hydrogen, would be pumped through the reactor where it would be vaporized and heated to a high temperature. Escape would be at high velocity through the exhaust nozzle.

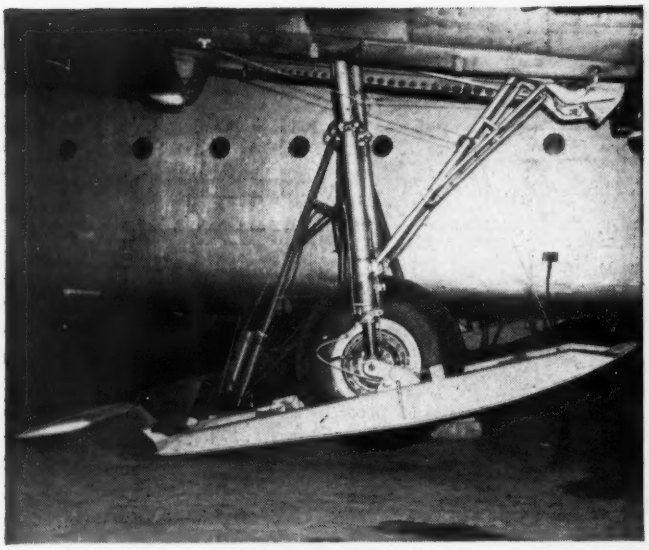
Nuclear energy offers a distinct advantage in rockets in that the specific impulse of a rocket propellant, the pounds of thrust that can be obtained from each pound of propellant used per second, is proportional to the square root of the absolute propellant temperature divided by the molecular weight of the propellant. Thus, highest possible temperature and lowest possible molecular weight are desirable factors.

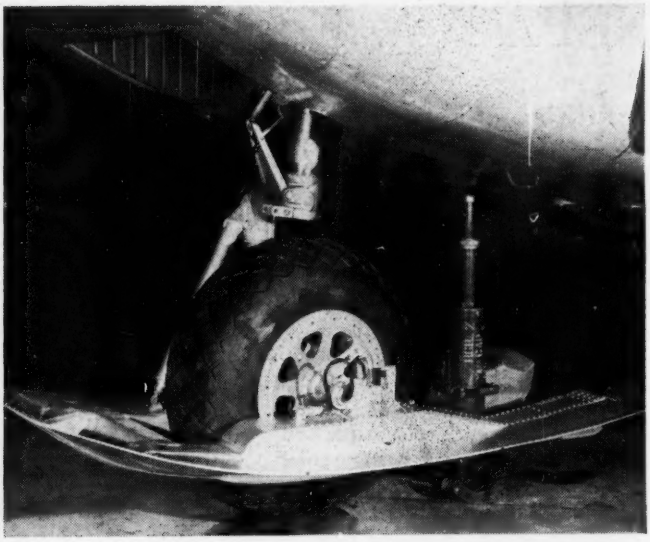
In a chemical rocket, the high temperature is obtained normally by combustion of a fuel and an oxidizer, whose products of combustion are then used as the propellant. Since the propellant is the result of the combination of at least two atoms, its molecular weight will be fairly high. For example, if hydrogen and oxygen are used, the resultant propellant is water vapor with a molecular weight of 18.

Whereas, if nuclear energy is used to provide the high temperature, there is no need for combustion, and very light propellants, such as hydrogen, with a molecular weight of 2, can be used.

New Board Members

Within a month after General Motors' withdrawal from North American, the aircraft company resumed a nine-member directorate with election to the board of three Los Angeles businessmen: William C. Mullendore, electric company president; Alden G. Roach, steel company president; and Chester A. Rude, banker.





Small wing (left) at end of main ski gear on C-82 holds ski in proper position during flight and helps lift the weight of the installation when gear is retracted. Nose gear ski on Packet is at right. Ski may be raised or lowered in relation to the wheel.

Services Investigate Utility of Ski Gear

Air Force and Navy tests conducted for evaluation of added undercarriage device to improve versatility.

Air Force and Navy tests for proving ski gear operation have been conducted with installations on various types of aircraft.

Navy tests were made with the Beech JRB and Douglas R4D (C-47). Skis were tested first in Canada, then in Antarctic operations.

Air Force tests—understood to have been started this spring in Alaska—have featured ski installations on the Fairchild C-82.

Air Force original ski gear (not on C-82) is reported to have torn off in flight. As a result, a symmetrical airfoil was added at rear of skis to maintain proper pitch during climb after takeoff and in landing approach.

Flow of air through a series of holes in the piece attaching the airfoil to the ski insures proper angle of attack.

Airfoil shape used on the Air Force installation differs from that on the Navy ski gear.

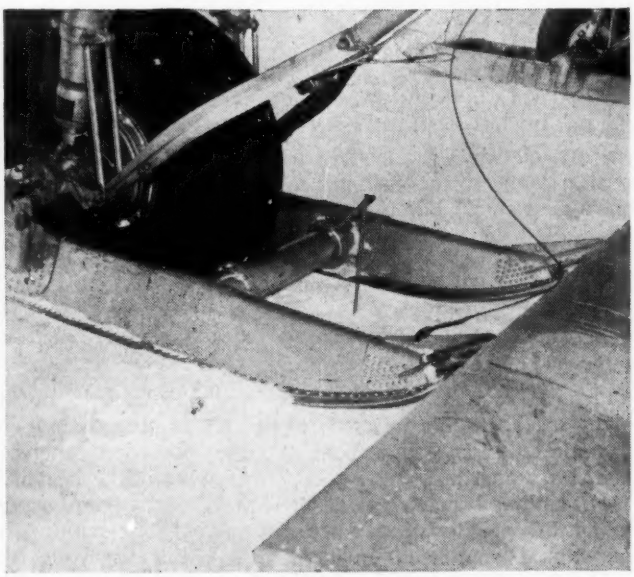
Weight of the R4D ski gear is 1100 lb. Material is 75ST dural, ¼-in. thick. Wheels protrude about 3 in. under the ski installation.

Navy used wheels for carrier takeoff in Antarctic, then made snow-landing with skis. Wheels were removed and operations were conducted on skis alone for 30 days.

Operation of R4Ds was at 35,000 lb. gross, and takeoff runs with skis were same as with wheels only. Jato was used for special overloaded takeoffs.

Navy pilots report ski operation to be as favorable as with wheels. They preferred skis without wheels installed on the gear, although operations could be carried out with both units installed, if necessary.

The ski gear is made for both services by Federal Aircraft Works, Minneapolis, Minn.



Main ski gear installation, left, is shown on Navy R4D. Closeup, right, shows aft portion of the gear with the wheel installed.

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CHEVROLET No matter what your needs may be, here are trucks that bring you a new measure of value—features that count in every phase of truck operation; a combination of features you'll find in no other trucks; features of Advance-Design! They're the only trucks that bring you Chevrolet's 3-way thrift—the *triple* economy of low operating costs, low upkeep costs and the *lowest list prices in the volume field!* See your Chevrolet dealer—and test the best!

Look At These Advance-Design Features!

NEW CHEVROLET 4-SPEED SYNCHRO-MESH TRUCK TRANSMISSION

A special feature in heavy-duty models that assures new operating ease and efficiency.

SPLINED REAR HUB CONNECTION

Greater strength and durability in heavy-duty models with this exclusive Advance-Design feature.

NEW ADVANCE-DESIGN-GEARSHIFT CONTROL

A steering column gearshift in models with 3-speed transmissions provides greater driving ease and convenience.

NEW FOOT-OPERATED PARKING BRAKE

A feature that offers new clear floor area, safety and efficiency in models with 3-speed transmissions.

THE CAB THAT "BREATHES"*

Fresh air—is drawn in and used air forced out! Heated in cold weather.

IMPROVED VALVE-IN-HEAD ENGINE

The world's most economical engine for its size now has greater durability and operating efficiency.

PLUS Uniweld, all-steel cab construction • New, heavier springs • Full-floating hypoid rear axles • Specially designed brakes and Hydrovac Power brakes in heavy-duty models • Ball-bearing steering • Double-line pre-selective power shift with 2-speed axle at extra cost • Wide base wheels • Standard cab-to-axle-length dimensions • Multiple color options.

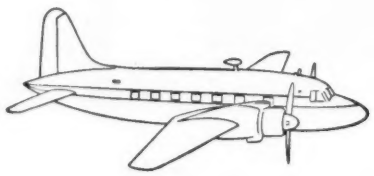
**Fresh air heating and ventilating system optional at extra cost.*

ADVANCE DESIGN CHEVROLET TRUCKS

O.A.38

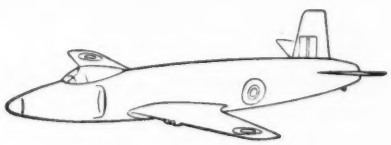
Makers of Aviation History

THROUGHOUT TWO WORLD WARS and the years of peace between, the foresight of Vickers-Armstrongs' designers and the skill of their engineers have been responsible for many of the important developments in aviation. Today the high standard of design and craftsmanship established by such aircraft as the 'Vimy'—the first aircraft to fly the Atlantic—the 'Wellington' bomber and the famous 'Spitfire' fighter is maintained by new combat and commercial aircraft, including:—



THE 'VIKING'

Britain's first post-war airliner . . . still the safest, most economical twin-engined passenger aircraft. Used by 14 famous air lines . . . outstandingly popular with passengers for its comfort and smooth flying.



THE 'ATTACKER'

Britain's fastest, most manœuvrable single-engined jet fighter . . . has been landed successfully on aircraft carriers . . . won, in February 1948, the International 100 k.m. Closed Circuit record at 564.88 m.p.h.

THE 'VALETTA'

A military transport specially designed for use as a trooper, freighter, paratrooper, glider tug, supply dropper or ambulance. Carries 36 troops over 300 miles . . . 20 paratroops and nine 350 lb. containers over 400 miles . . . or 5,460 lb. of freight more than 1,500 miles.

THE 'SPITFIRE' TRAINER

The machine that carries on the great tradition of the 'Spitfire', providing the pilots of tomorrow with a high performance two-seater trainer, perfected by ten years development and many thousands of hours operational flying all over the world.

Vickers-Armstrongs Limited

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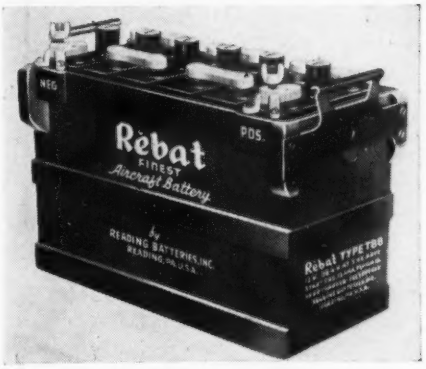
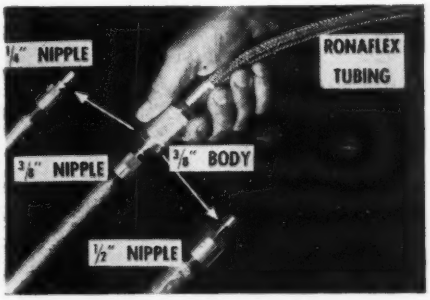
NEW AVIATION PRODUCTS



Lightweight Battery

New 12v. transport type aircraft battery, Rebat T88, is marketed by **Reading Batteries, Inc.**, Reading, Pa. Unit weighs 78 lb. wet, has 88-amp.-hr. rating, and measures 14 × 7¼ × 10⅞ in. It is available wet and charged for immediate service, or moist and uncharged for export or stocking.



Snap-On Flexible Hose

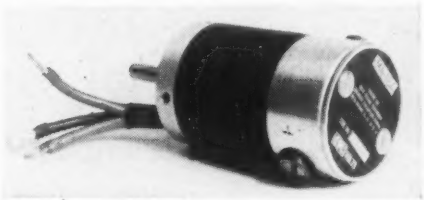
Flexible tubing with interchangeable snap-on couplings is available from **Ronaflex Tubing Co.**, Packard Building, Phila. 2, Pa. Degree of interchangeability varies with type and size of coupling. Thus, ⅜, ¼ and ½-in. bodies each fit ¼, ⅜, and ½-in. nipples. Claimed is that relatively few sizes of assemblies need be stocked to fit nipples ranging from ¼ to 2 in.

Seals Plane's Surface

Protective coating, ReGlo, represented as sealing aircraft against effects of weather, minor abrasions, acids, and salt air, is marketed by **Regal Air Corp.**, 318 West 39 St., N.Y.C. Coating is stated to dry out in 6-8 hr. and weigh 3 lb., forming flexible transparent film lasting up to 12 mo. Other features include: resistance to chipping, peeling, bubbling, cracking, scratching, or denting. Claimed is that finish does not damage surface, and may be removed with solvent.

Simulates Humidity

Used to test radio condensers to determine moisture resistance or performance, is new humidity simulation unit made by **Bowser Inc., Refrigeration Div.**, Terryville, Conn. Atmosphere conditions ranging from 20-95 percent, + 35 to + 175 deg. F., (dry bulb) are maintained automatically in cabinet—sizes from 10 to 35 cu. ft. Models operate on 110v., 60c., single phase current. Wet bulb control and humidity reservoir water level are maintained by float valves. Air movers provide circulation within stainless steel test space.

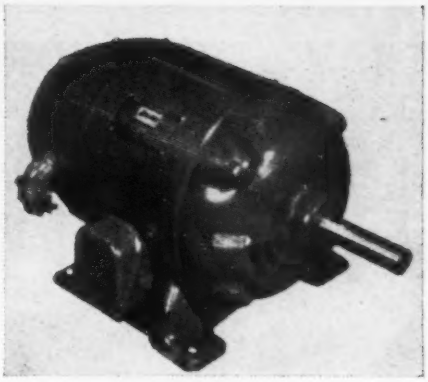


Small Motors

Fractional-hp. d.c. motors designed for trim-tab actuators, stall-warning systems, fuel valve actuators, bank-change switching and other applications, is announced by **Red Bank Div., Bendix Aviation Corp.**, Red Bank, N. J. Units are available in various voltage ratings, clock, counterclock, or reversible rotation, and with pinions, worms, or plain shafts. Motor diameter is 1⅝ in., length (less shaft) 2⅝ in., weight 12 oz.

Bonding Clamp

Adaptable for aircraft use is self-bonding cushion clamp made by **Thomas Associates**, 4601 Alger St., Los Angeles, Calif., with rubber specially compounded to conduct electricity. Units are available in sizes from ⅛ to 4 in. dia., in ⅛th increments.



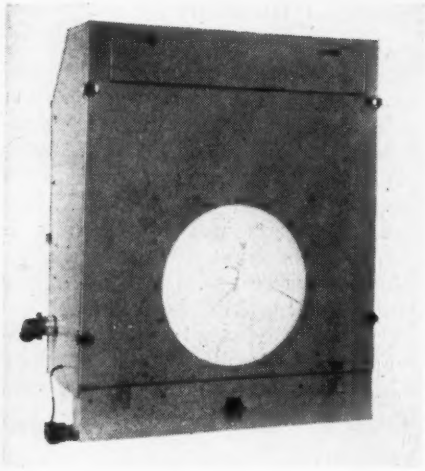
Induction Motors

For aircraft plant applications where adjustable speed or high-starting torque with low-starting current is required, wound-rotor induction motor is offered by **Westinghouse Electric Corp.**, 306 Fourth Ave., Box 1017, Pittsburgh, Pa. Of open drip-proof construction, unit's ratings are from 1-15 hp. Motors are obtainable for 60, 50, and 25c., two- and three-phase 208, 220, 440, and 550v.—1750, 1160, 870, 690, 580 rpm. for 60c.; 1450, 965, 715, 580, 485 for 50c.; and 1450, 750, 485, for 25c.

For RPM. Measurements

Small, lightweight tachometer heads, Type 54, are available from **Metron Instrument Co.**, 432 Lincoln St., Denver 9, Colo., for use with standard SAE and AN aircraft tachometer take-offs. Heads can be used with company's tach indicators to give full scale readings as low as 200 rpm. or up to 10,000 rpm. Units weigh 10 oz., are 2⅛ in. dia., and 4⅜ in. long. Operation is on contact principle, and shaft is mounted in permanently lubricated bearings. Torque is 1/20 oz.-in. for high speed types and ⅛ oz.-in. for low speed.

Operator's console.



Daylight display.

Daytime Radar Reading Eased

War-born device used at Australian airport to relay plane positions from main indicator to display screen.

MELBOURNE—Radar information is presented to the traffic control official at Mascot Airport, Sydney, by a novel daylight display device which permits him to carry on his functions while casually referring to the radar information when it is required.

The device was developed during the war by the Radiophysics Laboratory of the Council for Scientific and Industrial Research. It was one of the hush-hush developments under direction of Dr. E. G. Bowen, Chief of the C.S.I.R. Radiophysics Division, which contributed to Allied supremacy in radar techniques during the war.

▶ **Three Sections**—The complete installation consists of three sections:

(1) The radar, which is in a concrete pit in the airfield, with the aerial covered by a perspex radome;

(2) The tower radar equipment with the indicators; and

(3) The replotting equipment.

The complete equipment is operated from the airport control building.

The main indicator is mounted in the console shown at left above. From here the operator transmits the reading of the airplane positions to the daylight display in the flight control office, shown in the second photograph.

▶ **All Craft Traced**—The operator traces the tracks of all aircraft within range on the Plane Position Indicator (P.P.I.) tube, incorporated in a normally dark recess in the console. Aircraft positions are transmitted from the radar set on the field. An illuminated stylus is used to trace the readings in the dark recess. Two wires attached to the tip of the stylus (faintly visible near the middle finger of the operator) wrap around pulleys on the shafts of two transmitting selsyns which drive two receiving selsyns in the daylight display.

From the receivers two thin wires connect with a writing point. This repeater system produces an enlarged version of the movements across the cathode ray tube by moving the writing point across the back of a paper screen in the daylight display.

The screen is saturated with a solution of starch, potassium iodide and sodium carbonate and rolled onto the back of the brilliantly illuminated perspex window in the daylight reading unit. The marks can be seen clearly against the bright illumination, which is produced by daylight-type fluorescent tubes.

▶ **Replotting**—On the main indicator, the operator plots the course of an aircraft by moving the spot of light emitted from the stylus onto the track seen on the radar screen, presses a button and moves the light along the track to the location of the aircraft. Pressing the button applies 18 volts D.C. to the writing point at the display screen. Electrolysis of the potassium iodide results in an accumulation of iodine at the writing point and so produces a purple-black coloration of the starch. Operation of the button also brightens the spot of light cast by the stylus, so that the phosphor of the cathode ray tube is excited to give a bright mark to correspond to the mark on the screen of the display.

Each aircraft is plotted in turn. Marks fade within five minutes, the time an aircraft is normally in the control area.

2000 Passengers a Day At Venezuelan Airport

CARACAS – Climaxing a steady growth since the war, Maiquetia—Venezuela's busiest airport—has reached a 2000-passenger-a-day level. Maiquetia is a one-runway seacoast airport serving both LaGuaira, principal seaport, and Caracas, capital of Venezuela some 20 miles inland.

Some 20 domestic operators use the field. International lines such as LAV (Linea Aeropostal Venezolana, government-owned line), KLM, Pan American and TACA carry passengers east and west, and north to Caribbean and U. S. points.

Mail and cargo shipments also have shown a steady increase, currently running over 176,000 lb. daily. Fresh foods are among the heaviest import items.

▶ **150 Movements a Day**—Average daily arrivals and departures now approximate 150. International lines confine their operations to daylight hours because of lack of adequate night flying equipment at the port. Meanwhile the Ministry of Public Works is pushing construction on La Carlota airport, some 15 minutes from Caracas, to make it capable of handling four-engine equipment. The government bought the land for about $3,000,000. Drainage and leveling—now under way—will cost $2,000,000 more. The work is scheduled to be completed by November of this year.

Brazil and Argentina Reach Aviation Accord

RIO DE JANEIRO—Brazil and Argentina have signed a commercial aviation agreement whereby each authorizes one or more lines of the other to fly into or across its territory.

The accord formalizes what had been in effect for some time. Brazil's "Panair do Brasil" is flying regularly to Buenos Aires and Argentina's "FAMA" is operating through Brazil to Europe.

Under the agreement, other lines may be approved, but in no case can an Argentine company carry traffic purely inside Brazil, and vice versa.

OSTUCO AIRCRAFT TUBING

JET PROPELLED AIRPLANES, particularly those intended for carrier operation, involve a radically new concept of aircraft design and construction. Yet here, as in all U.S.-built aircraft, OSTUCO Tubing provides the same unique structural advantages, through its inherent strength-without-weight ratio, which have contributed so importantly to the development of aircraft design in the past.

OSTUCO aircraft engine tubing, aircraft mechanical tubing and non-oxidized bright finished airframe tubing—used for fuselage and structural parts—are all produced to meet Army, Navy and AMS specifications. OSTUCO Aircraft Tubing, proved in service, is available to you, together with the knowledge and experience that marks OSTUCO engineering and craftsmanship.

Write today, without obligation, for your copy of Booklet A-2, containing helpful, factual information on OSTUCO Aircraft Tubing. Address the nearest OSTUCO Sales Office, or write direct to General Office, Shelby, Ohio.

THE OHIO SEAMLESS TUBE COMPANY

***Plant and General Offices:* SHELBY, OHIO**

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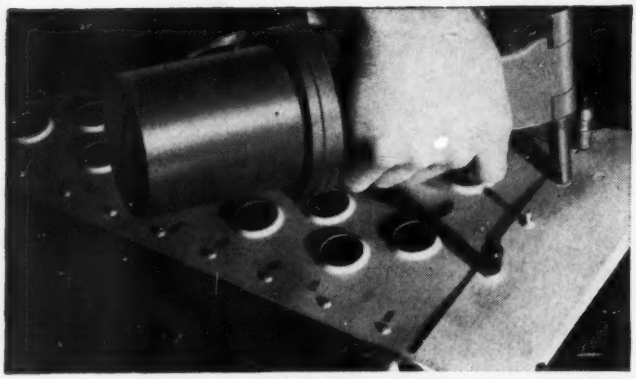
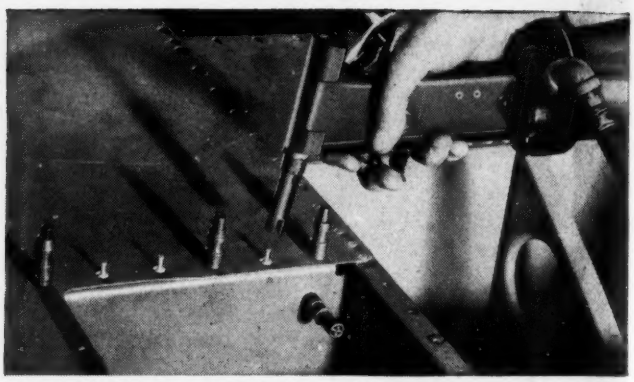
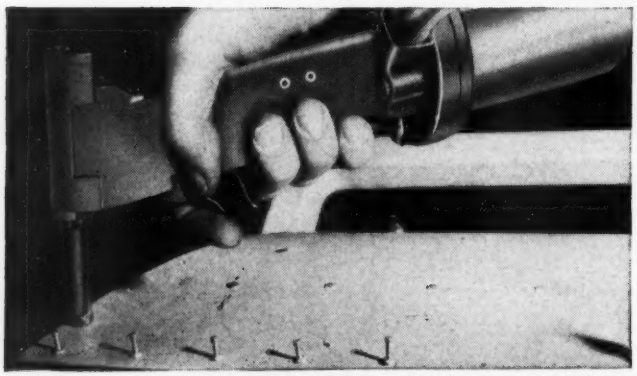


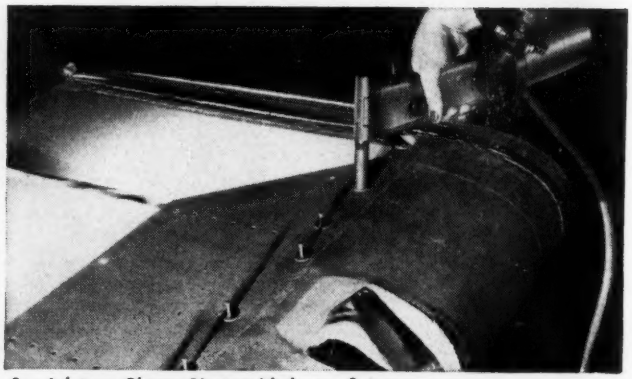
Sub-assembly being fastened to a tubular member with Cherry Blind Rivets at the Boeing Airplane Company, Seattle, Washington.



Cherry Self-plugging Blind Rivets securely fasten panels on B-50 bomb-bay doors.



Boeing fabricated chairs are assembled with Cherry Self-plugging Blind Rivets.



Special type Cherry Rivets with large, flat, thin heads are used to fasten cloth to ailerons.

CHERRY BLIND RIVETS . . . . . make the hard jobs easy

PRODUCTION IS SMOOTHER. Cherry Blind Rivets free production planning for difficult-to-reach blind spots in all types of assembly work. Fuselage, wing, tail group, and other aircraft assemblies are finished much faster with Cherry Rivets. Only one man is needed . . . There's no bucking with Cherry Rivets. Cherry Blind Riveting gives you a quicker fastening method fully adapted to production-line assembly work.

SPECIAL FASTENING CHARACTERISTICS GIVE YOU BETTER RESULTS. Cherry Rivets are designed with more shank expansion . . . that means tighter, vibration-free joints. They have greater hole-diameter and grip-length tolerances . . . that means more latitude for all types of assembly jobs. Cherry Rivets are available in *more* rivet types, *greater* range of diameters, and the greatest number of grip lengths.

COMPARABLE TO SOLID RIVETS. Cherry Self-plugging Rivets have shear values comparable to solid rivets. Excellent hole-filling qualities insure vibration-resistant joints. Cherry Rivets combine simplicity with strength . . . the simplicity of their fastening technique makes them a "standard" on aviation production lines. Try Cherry Rivets today and gain years of less-expensive, more efficient production assembly.

Cherry Rivets are made from aluminum alloy, steel, or Monel. Standard rivets come in five diameters and two head styles. There is a wide range of grip lengths. Special heads, diameters, grip lengths, and alloys can be made to order. WRITE US TODAY FOR FURTHER INFORMATION. BOOKLET MAILED ON REQUEST. ADDRESS DEPT. G-110, CHERRY RIVET COMPANY, 231 WINSTON STREET, LOS ANGELES 13, CALIFORNIA.

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Cherry Rivet Company
LOS ANGELES 13, CALIFORNIA

CHERRY RIVETS ARE APPROVED BY CIVIL AERONAUTICS AUTHORITY AND UNDERWRITERS' LABORATORIES, INC.

Australia Tests Flying Wing

MELBOURNE—Council for Scientific and Industrial Research has undertaken the development and testing of the Griffith-type wing plane as part of Australia's share in the research work parceled out by the Commonwealth Aeronautical Research Conference in London.

The design, suggested by Dr. A. A. Griffith in England as a means of using suction to overcome airframe drag, achieves laminar flow over the whole surface, by introducing a discontinuity at which a suction slot draws off the boundary layer. The laminar flow near the surface produces small values of skin friction per unit of area, making possible the use of thick wings with drags not appreciably greater than with thin wings now used. This makes a flying-wing type of passenger-carrying airplane practicable in relatively small sizes.

First tests will be made with a towed glider fitted with a 30-percent-thick suction wing. The boundary layer will be removed by a motor-driven blower carried in the fuselage.

Airline Suspends Sales

RIO DE JANEIRO—Linhas Aereas Brasileiras, one of several Brazilian airlines operating in the red, suspended ticket sales late in June.

Flight resumption possibilities are rather hazy, as salaries are months in arrears and shareholders have been warring among themselves.

Aviation company executives generally forecast the shutdown of other small Brazilian lines soon. Among the companies that the Ministry of Labor currently has been investigating is the Navegacao Aerea Brasileira, which operates routes to the northern and southern parts of Brazil.

The airline situation became so bad that oil companies were demanding cash payment from most of these lines on gasoline delivery.

Stir Over Airmail Contract

MELBOURNE—Charges that the Commonwealth Government is using discriminatory airmail subsidies to pull Trans Australia Airlines, its money-losing air service, out of the red ink have caused a new stir in Australia.

TAA is to receive $1,000,000 in the 1948-49 fiscal year for the carriage of airmails. It is said that this includes a 200 percent premium on top of the regular pound-mile rates at which the airline has been paid so far, and at which private airlines will continue to be paid.

In the House of Representatives it was alleged that almost none of the airmail surcharge of 4 cents per half-ounce on domestic letters went to the postmaster general's department but almost the entire revenue was handed to the Department of Civil Aviation. The postmaster general is said to have paid the Department of Civil Aviation $3,850,000 for the conveyance of airmails last year, but only $1,100,000 was expended by the DCA for this purpose. The balance is stated to have been credited to the DCA's revenue.

New Airlines for India

NEW DELHI—Two new airlines have been added to India's list of scheduled operators.

Granted temporary certificates are: Dalmia-Jain Airways, which will fly from this city to Srinagar in Kashmir; and Jupiter Airways, which will fly from Madras to this city by way of Vizagapatam, Nagpur and Agra.

World News Briefs

BANGALORE—

Hindustan Aircraft Ltd., jointly owned by the Government of India and Mysore province, is assembling Tiger Moths and Prentice Trainer planes as part of Indian defense department's program.

MELBOURNE—

During ten months ended Apr. 30, Australia imported $3,900,000 worth of aircraft and accessories from all countries. This is compared to $5,900,000 spent in the corresponding period last year. Decline is largely due to shortage of dollars. . . . Australia National Airlines claims that its Skymasters were on time 254 out of 255 trans-Pacific flights. The only delay occurred when an Australia-bound plane was held up briefly at Fiji for engine readjustments.

JOHANNESBURG—

South Africa's first radar station for civil flying has been installed at the Palmietfontein airport. The radar equipment supplements the standard beam approach already in use at the field. . . . Union Government has appropriated $700,000 for improvements at Palmietfontein. Alterations will include better hangar and workshop accommodations as well as enlarging the terminal building. . . . The South African Air Force is recruiting ground crewmen in England since it cannot secure the services of enough South Africans. . . . South African Airways has just completed experiments which may result in equipping its Skymasters with movie projectors to entertain passengers on lengthy journeys. . . . Airfreight rates on Springbok service between Johannesburg and London and intermediate points have been reduced. . . . Pan American's Clipper Intrepid, flew from La Guardia to Palmietfontein in 38 hr. 58 min., or 4 hr. 47 min. faster than time scheduled for the direct New York-Johannesburg route.

RIO DE JANEIRO—

Panair do Brasil claims new "Connie" record of 3 hr. 55 min. from Buenos Aires to Rio. . . . C. E. "Dinty" Moore has been named special representative of PAA in Brazil. Moore, who has been with Pan American for 19 years, has served in Havana, Ciudad Trujillo, Puerto Rico, Buenos Aires and Miami.

CARACAS—

To build a backlog of civil pilots, Venezuela's Ministry of Communications is establishing ten annual scholarships to cover cost of six months' flight instruction. . . . Linea Aeropostal Venezolano is planning to extend its service to New Orleans and Houston and already has made a survey flight over the route.

MANILA—

Philippine Air Lines DC-6 Pacific Pacemaker "Leyte" made record-breaking inaugural flight from Manila to Shanghai in 4 hr. 17 min.

BRUSSELS—

SABENA Belgian Airlines' trans-Atlantic flight crew members now include pursers in addition to stewards and stewardesses.

NEW DELHI—

Royal Indian Air Force believed it established a record for high-altitude operation of C-47s when the plane, en route to an Indian army outpost in the Kashmir fighting zone, cleared a 19,000-ft. mountain barrier.

MILAN—

Two new Italian transports have gone into limited production—a four-engine plane by Savoia-Marchetti, and a three-engine Fiat of the G.212 type.

BOMBAY—

Ten Beechcraft Bonanzas have been added to India's register of civil aircraft, according to Ambica Air Lines Ltd., Beech agents in India and Ceylon. Eight were sold to private owners and two to the government of the United Provinces for official use.

Add the Boeing B-50 to the growing list of modern aircraft that are capitalizing on the lighter weight, stronger construction and accurate pre-testing of FEATHER-WEIGHT oil coolers.

These modern FEATHER-WEIGHTS get their minimum weight and maximum resistance to extremes of temperature, vibration and shear from patented aluminum-alloy brazing of their thin all-aluminum sections.

How FEATHER-WEIGHTS will perform under actual flying conditions is clearly forecasted by critical tests in Clifford's wind tunnel laboratory, the largest, most modern in the aeronautical heat exchanger industry.

Inquiries concerning FEATHER-WEIGHT all-aluminum oil coolers are invited.

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Boeing B-50

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Airline Equity Market Analyzed

Confused outlook contributes to adverse psychology; wide spread noted in carriers' stock performance.

In the face of general rising market prices, quotations for airline equities continue at depressed levels. Since Jan. 1947, while a recognized index of 65 stocks rose more than 6 percent, the air transport group declined 11.4 percent.

This is merely a reflection of the low estate in which the fortunes of the airlines are held by investment groups at the present time. The general investment attitude appears to be that other industries have clearly defined outlooks assuring a sustained high rate of profitable activity so why invest in airlines where so much uncertainty prevails. This is the market psychology, for example, which has propelled oil and railroad shares into new high ground while airline issues have remained in the doldrums despite manifestations of improving conditions for a number of carriers.

The accompanying table reveals the market performance of all listed airline common stocks. Along with the all-time highs recorded in late 1945 or early 1946, the 1948 range thus far and the percentage decline from peak levels are shown.

▶ **Expectancy**—Merely because a company's shares sold at 50, there is no basis for expecting the re-attainment of that market level from the present price of 7.

Yet this was the reckless approach followed by many speculators and investors who made commitments in airline securities at various stages of the broad decline during the past two years. For instance, when Northwest sold around 30, a number of investors considered the shares attractive as they were off more than 50 percent from their high. However, no regard whatsoever was accorded the basic factors then influencing the industry and Northwest.

As a result, despite this seemingly attractive purchase made at a 50 percent "discount" from the peak price, this proved to be an expensive commitment in view of subsequent market action taking the price of Northwest down to around 12, recovering to recent levels of about 14. In other words, the Northwest purchaser at 30 has suffered a paper loss of more than half of his original investment.

▶ **Trend Comeback**—Commitments in the air transport industry during the past two years on this market "hunch" basis were fairly widespread. One of the major aftermaths remains in that many have been hurt so badly that they are very timid in restoring investments in the industry or encouraging others to purchase airline equities.

The smallest relative decline of 47 percent was posted by Eastern Airlines. The sustained earning power reported by this company has given it the closest rating of investment character that anyone in the industry has attained.

The sharpest decline belongs to the junior equity of Northeast, off some 89 percent from its peak. Considerable market attraction for Northeast developed as a result of the Atlas Corp. interest. Following the leader in this instance was disastrous. All the Atlas Corp. magic was worthless in placing Northeast on a profitable footing. When the holding company finally writes finis to its airline investment, it will do so at a substantial loss.

Investors in Chicago and Southern have been badly mauled. The current quotations for the company's voting trust certificates show a decline of 84 percent from the all time peak. The securities of this company were only recently listed on the New York Curb Exchange, having previously been traded "over-the-counter". Trading markets for Chicago & Southern are very limited in view of the two classes of securities. One class represents the actual shares and the other the voting trust certificates. This voting trust arrangement is a throwback from the early periods of corporate financing and is rarely found in American industry today. Any equity financing that may be undertaken in the future by C&S will be complicated by the existence of these voting trust certificates.

It is interesting to observe that in the market ranges thus far this year, American, Braniff, National and Western have moved very much together.

▶ **Selective Shifts**—Probably no industry affords so many opportunities for selective shifts as does the air transport group. At one time it would have been possible to have sold Chicago & Southern and purchased Eastern with a few points to spare. Such a trade would have been almost three times as profitable than by remaining invested in C&S.

The same selective pattern will prevail in the future. It is too much to expect that in any market recovery, airline shares will retrace the same scale followed in their descent. Management qualities have been demonstrated, operating conditions have changed, new route structures exist and a host of other elements never remaining static, will influence the course of market prices for the individual issues.

As earnings return to the airline group and have hopes of being sustained, so will the market atmosphere surrounding airline shares improve. Frequently, however, the market discounts events long before their arrival.

—Selig Altschul

MARKET RANGE

Listed Airline Common Stocks

	1945-6 High	1948 Range High	1948 Range Low	July 2, '48 Last	% Decline From 1945-6 High
American	19	10	7¼	8¾	54%
Braniff	37	10¼	7⅛	8½	77
Chicago & Southern*	35½	7¾	5⅛	6⅜	84
Colonial	45	9⅛	6⅜	7½	83
Eastern	33	20⅜	16⅛	17⅜	47
National	41	10¼	7½	8⅜	80
Northeast	25	3⅜	2⅜	2⅜	89
Northwest	63	17⅛	11⅞	14⅛	78
Pan American	29	11¼	8½	10⅜	64
PCA (Capital)	49	8⅜	5⅜	6¾	86
TWA	79	22⅜	12	13⅞	82
United	62	19¼	14½	15	76
Western	40	10½	6⅜	8⅜	78

* Voting trust certificates.

FLYING PANEL of IAS personal plane forum at Detroit: left to right, George Tweney, associate professor of aeronautical engineering, Wayne University; Grover Loening; Lawrence M. Patrick, vice chairman IAS Detroit section; Arthur H. Tully, jr., Harvard University; Fred E. Weick, Texas A & M College; Wolfgang Langewiesche, Kollsman research pilot. Patrick served as toastmaster.

Experts Call for Improved Planes

Panel of engineers blueprints plane of future at IAS "flying forums" held in Detroit, Wichita and Dayton.

By Alexander McSurely

A blueprint for a better personal aircraft of the future emerges from engineering discussions stimulated by the recent "Meeting on Wings" of the Institute of the Aeronautical Sciences.

The unique meeting, held on three successive nights at Detroit, Wichita and Dayton, brought a panel of experts to each of these cities for discussion of personal plane design requirements, followed by a forum at which other engineers contributed their ideas.

Following characteristics and design features for tomorrow's plane are suggested:

- Quietness as to propeller, engine clatter and exhaust.
- Short takeoff, of 100 to 200 ft.
- Safe landing or takeoff in 500 ft.
- Greatly improved spiral stability for easier instrument flying.
- Controlling air flow over wings, by boundary layer control of some form.
- Roadability.
- Crosswind landing gear.
- Greater roominess.
- Convertaplanes which would combine the advantages of both helicopters and fixed-wing aircraft.
- Gust alleviating flaps.
- Elimination of icing hazard by fuel injection or pressure type carburetors.

▶**Panel**—The traveling speakers' panel, headed by Grover Loening, consultant to Defense Secretary Forrestal, included: Prof. Fred E. Weick, director of the personal aircraft research center, Texas A & M College; Arthur Tully, former Massachusetts aeronautics director and co-author of the recent Harvard University study "Personal Aircraft Business at Airport"; Jerome Lederer, aviation safety specialist and head of Flight Safety Foundation, Inc.; Wolfgang Langewiesche, Kollsman research pilot and flight analyst.

Weick discussed computations for a plane capable of meeting the short takeoff and landing requirements, pointing out that the basic one was that the plane had to be relatively lightly loaded under the condition in which it operated.

It would require an increase from a typical present day four-placer of approximately 2200 lb. gross weight and 150 hp. with a 35-ft. wingspan to 2600-lb. plane with 300 hp. and 45-ft. span to carry same load out of small fields.

▶**Flexible Loading**—"We are likely to find it economic to design an airplane that can use the small fields relatively lightly loaded and then use larger fields with a larger load if the occasion demands," Weick predicted.

He cited the Curtiss Tanager, the German Fieseler Storck and the Ryan Dragonfly as three types of airplanes that would operate out of small fields, but pointed out that they were "relatively complex and expensive for the load they would carry."

His analysis assumed a partial span flap and a lift coefficient for takeoff of 1.8.

He called for a serious study of application of high lift devices on personal aircraft and an investigation of the amount of lift coefficient needed for a small plane. He pointed out that a high lift coefficient was impractical unless there was enough span and enough power for weight to be carried.

▶**Simpler Flying**—Weick also called for research toward simplifying operations required of the pilot in the new high performance personal planes, which include such items as flaps, retractable gear, controllable propellers, with manifold pressure requirements, etc.

Langewiesche emphasized the need for improved spiral stability, and pointed out that the greatest problem of present-day instrument flying was the necessity to stay on the controls constantly. "Make airplanes fly straight if you leave them alone," he urged.

He called for a plane which the pilot could leave alone for two or three minutes at a time, instead of two seconds, while flying instruments so that the pilot would have time to check his charts and make his computations.

▶**Small Field Performance**—Tully outlined need for a personal plane with small field performance, as indicated by the survey of 180 fixed base operations which preceded the Bollinger-Tully report. Tully asserted a survival of 4000 operators out of a total of 8000 found last year in his survey would be "optimistic" once the GI flight training program was out.

He stated that sales of 40,000 to 60,000 planes a year, or 10 to 15 per operator, were required to support the present number of operators. This contrasts with only 15,000 planes sold in 1947. He concluded that improved aircraft which can give added utility by close-in landings are essential.

Spokesmen for three aircraft companies, Tom Salter, Cessna chief engineer; Jerry Gordon, Beech engineer, and Ray Hermes, Aeronca chief engineer, pointed out economic problems of the manufacturers in making the design changes recommended. Gordon contrasted the Beech Bonanza with the Beech Model 17 biplane of ten years ago, pointing out improvements.

The manufacturers' spokesmen urged, "tell the public what we have, a usable product, not spend our time bemoaning our unfortunate lot."

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EXTRA powerful leverage . . . precision-built, reversible ratcheting mechanism . . . year-after-year dependability . . . these are the features you find in a Snap-on Heavy Duty Ratchet. It's husky enough to break loose the tightest of those large nuts and bolts . . . its efficient, smooth-working action helps cut "down time" to a minimum.

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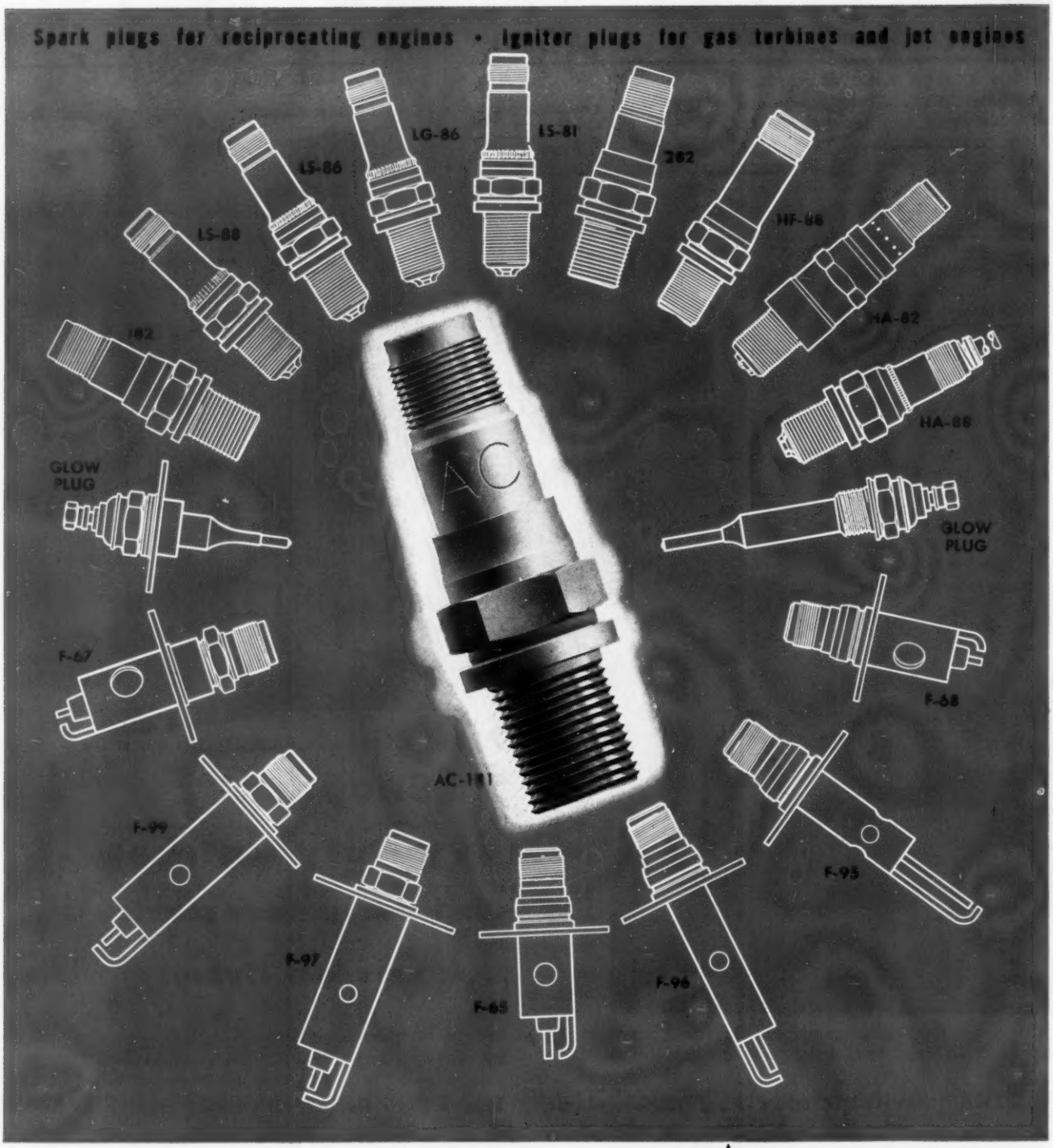

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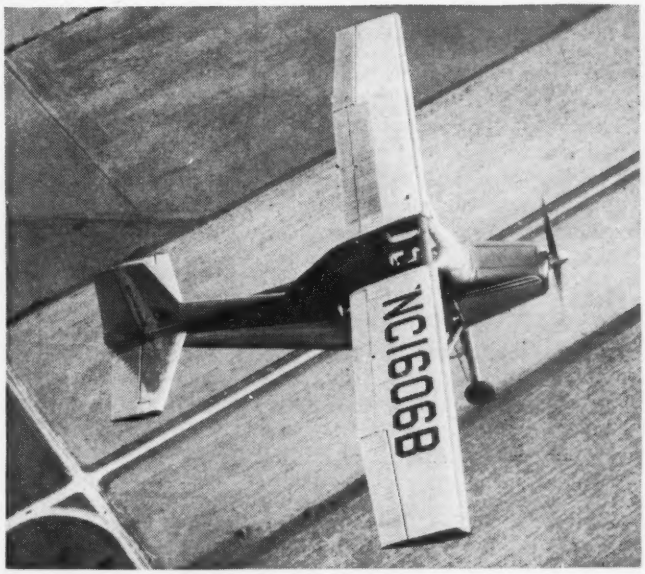
First 1949 production Silvaire Sedan with Luscombe Chief Test Pilot Horace Scoggins.

Closeups of the Luscombe Silvaire Sedan



Unusual flight view of 1949 Silvaire Sedan.

Landing light installation in nose.

Roomy interior viewed through rear window.

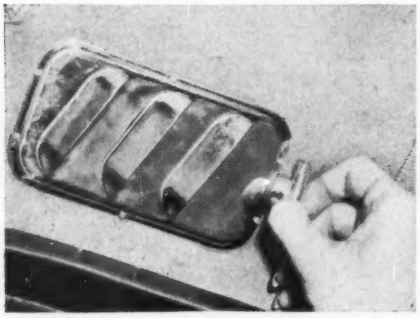
New Orders for Four-Placer Bring Stepped-Up Production

Production of Luscombe's Model 11A Silvaire Sedan at the Dallas plant is being stepped up from one a day to take care of additional orders for the $6995 all-metal four-placer.

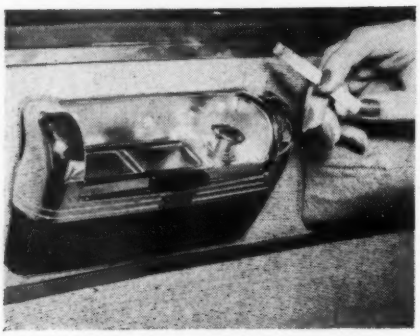
First detailed performance figures and specifications announced for the production model include: Top speed, over 140 mph.; cruising speed, 130 mph.; stalling speed with flaps, 55 mph., without flaps, 58 mph.; rate of climb at sea level with gross load, 900 ft./min. service ceiling, 17,000 ft.; takeoff run, 800 ft.; landing roll, 500 ft.; fuel capacity, 42 gal.; fuel consumption at cruising 9 gal./hr.; range over 500 miles.

Engine, Continental E-165 which delivers 165 hp. at 2050 rpm. and 120 hp. (normal cruising hp.) at 1850 rpm. Propeller, Sensenich, fixed pitch, 80 in. diameter.

Wingspan 38 ft.; wing area, 165 sq. ft.; length 23 ft. 6 in.; height 6 ft. 10 in.; maximum cabin height, 52½ in.;



Individual ventilators.



Individual ashtrays.

maximum cabin width, 45 in.; baggage compartment capacity, 6 cu. ft.; maximum cargo space, 60 cu. ft.; door size 30 by 45 in.

Window area, approximately 3716 sq. in.; gross weight, 2280 lb.; empty weight, 1340 lb. with standard equipment, or 1260 lb., stripped for cargo carrying. Useful load, 940 or 1020 lb.; cargo load allowance with pilot and full fuel load, 600 lb.; main gear tread (static no load) 100 in.

Plane is of all metal construction with two spar, stressed-skin wing, with single non-welded lift strut. Flaps and brakes are hydraulically operated.

Standard equipment includes Delco Remy starter and generator, Kollsman and Airpath flight instruments, Maule tailwheel, Willard battery, AC and Stewart-Warner engine instruments, landing and position lights; individual ventilators, ash trays with lighters, map cases, sound proofing, heater.

Airport Wins

Staten Island Airport is back on its old flying time schedule—from sunrise to a half hour before sunset.

The Department of Marine and Aviation cut down on the field's flying hours June 3, when it placed a 7:30 p.m. deadline on the airport's activities. Reason: an outdoor movie near the field wanted to show its movies undisturbed (AVIATION WEEK, July 5).

Edward J. McCormick, president of the airport, said the bulk of his business occurred just before sunset. The new order followed McCormick's fifth show-cause petition.

BRIEFING FOR DEALERS & DISTRIBUTORS

OREGON AIRPORT RULING—Injunction against Ski Park Airport near Oregon City, sought by adjacent property owners, has been denied by Judge James W. Crawford, Portland, who ruled: A legally established airport cannot be restrained from reasonable operation even if operation of the field does involve a measure of discomfort and unpleasantness to nearby residents.

Plaintiffs had claimed low flying aircraft decreased the value of their property.

Judge Crawford ruled that persons residing in unrestricted areas must assume the risk of a legitimate use of adjacent property which may to some extent impair their enjoyment of their own property. He found an absence of evidence that the airfield operators had failed to exercise reasonable concern over convenience, safety and comfort of the plaintiffs.

SALVAGE LAW INVOKED—Laws of salvage are being invoked against McFadden Flying Service, Inc., Holman Field, St. Paul, in connection with a lightplane which crashed into the Mississippi River near the airport and sank out of sight. Pilot and student escaped to shore. Four St. Paul men fished it out of the water, and then McFadden brought legal action to regain the craft.

Attorneys for the men who hauled it out of the river now are asking $600 salvage claim, contending that the Mississippi is a navigable stream and that maritime law should also apply there. McFadden's insurance company which is fighting the case contends that regardless of the situation, the airplane is not a ship and is not included under salvage law.

ACCESSORY SHOW—Later indications are that the trade show in connection with the ADMA-NATA joint meetings in Cleveland will be largely confined to accessories. The show is scheduled for Nov. 15, 16 and 17 and will be restricted to manufacturer members of ADMA. The ADMA session will be held at the Statler, while NATA will be meeting at the Allerton. In addition to the meetings and show, there will be a series of informal conferences between dealers, distributors and manufacturers.

BIDS FOR MAITLAND AIRSTRIP—CAA has approved runway and facility improvements at Maitland Downtown Airstrip, Milwaukee, and bids for construction are to be invited sometime this month. First stage of the improvement costs approximately $200,000 of which the federal contribution is $100,000, the remainder contributed by the city ($80,000) and state ($20,000).

When completed the field will be able to handle twin-engine planes as large as DC-3s. In addition to runway lengthening and enlargement, new facilities will include taxiway, autoparking lot, and water and sewer lines.

AUTO DEALER USES NAVION—Sample of the uses to which a resourceful businessman can put a business plane is the utility that J. D. Porter, Paris, Tenn., Chevrolet dealer is getting out of his four-place Navion. Porter says it makes at least 25 business trips a month between Paris and cities like Memphis, St. Louis and Nashville.

Some of these are made to carry drivers to pick up automobiles, while other trips are for hauling equipment to Memphis for quick repair, transporting executives to meetings and conferences and promoting good will. Most car dealers could use a plane like it to real advantage, Porter asserts.

A frequent car sales clincher is a promise to a prospect that Porter will fly him to the factory to get delivery of his car.

SHRINKING RUNWAYS—Temperature and barometric pressure effects on takeoff and landing performance are summarized for lightplane pilots in a new CAB Safety Bureau Bulletin No. 180-48. The bulletin takes a typical lightplane with a wing loading of 7.5 lb. sq. ft. and a power loading of 20 lb. hp. on a flight from New York where altitude is 19 ft. above sea level to Denver where it is 5320 ft., showing varying takeoff runs required at cities en route. They range from 650 ft. at New York to 1260 at Denver, with the temperature at standard 59 deg. Fahrenheit. On a hot day of 100 deg., the bulletin says the takeoff run would increase to 790 ft. at New York and to 1540 ft. at Denver.

—ALEXANDER McSURELY

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New Mail Rate Gives C&S Profit

While setting pay high enough to wipe out carrier's 1948 deficits, CAB hints that fares should go up.

Chicago & Southern Air Lines has found what most of the air transport industry is seeking—a silver lining in the dark clouds piled up by heavy post-war losses.

Civil Aeronautics Board in a sweeping decision offered C&S sufficient additional mail pay to wipe out more than half of the $1,863,000 domestic operating deficit incurred by the carrier during 1946 and 1947.

At the same time the Board set up new domestic mail rates retroactive to Jan. 1, 1948, which gave the company a profit for the first six months of this year and provide reasonably bright prospects of future earnings.

▶**Losses Not Frozen** — CAB's action focused attention on the transitory nature of some of the nearly $21,000,000 in operating losses suffered by the 16 domestic trunklines in 1947. Other carriers confidently expect to be able to join C&S in recouping a substantial part of last year's losses through mail pay adjustments.

But a number, including American, Northwest, United and TWA, apparently are barred from this relief by previous CAB decisions. These four, which lost more than $15,700,000 on domestic operations in 1947, were deprived of mail pay adjustments for periods prior to Jan. 1, 1948, in the Board's "big five" opinion three months ago (AVIATION WEEK, Apr. 19).

▶**Policy Defined**—A warning which applies to the entire certificated airline industry accompanied the award to Chicago & Southern. CAB said flatly it would not use mail pay to compensate a carrier for all of the increased costs arising from the current inflation spiral.

"Further increases in passenger and cargo rates may well be required if rising price and wage levels continue to be reflected in increased unit cost of revenue traffic," the Board declared.

"There can be little economic justification at this stage of air transport development for a rate-making practice which would underwrite with increased mail pay the total impact of rising price and wage levels upon operating costs, irrespective of whether subsidy or service mail rates are established.

"It is," the Board emphasized, "just as important in this industry as in others that the selling price of the product produced be kept in reasonable alignment with the price and wage levels reflected in the costs of such product."

▶**Passenger Fare Boost?**—CAB recognized, however, that Chicago & Southern had met part of its increased costs late lasf year when the company went along with the rest of the industry in raising passenger fares 10 percent. Whether this fare hike will prove sufficient to meet the cost level after mid-1948 is open to question, the Board indicated.

Fare increase talk had already begun to spread through the industry before CAB defined its position to C&S. United Air Lines has hinted at an upward movement. But there is little enthusiasm for a fare boost, which would be the third since April, 1947.

The statement of tentative findings issued in the Chicago & Southern mail rate case offered that carrier $3,139,000, or 20.69 cents a revenue plane mile, for services performed between Jan. 1, 1946, and Dec. 31, 1947. This amount exceeds by $1,055,000 the payments actually made to C&S under its former rates over the two-year period and cuts the 1946-1947 operating deficit from $1,863,000 to about $800,000.

▶**Minimum Loads**—Since June, 1946, Chicago & Southern's mail rate had been 60 cents a ton mile with a minimum capacity factor provision. Under this setup, the company was paid for minimum mail loads whether or not the loads actually were carried.

A new mail pay formula, retroactive to Jan. 1, 1948, specifies sliding scale mail compensation hitched to Chicago & Southern's passenger load factor. Similar formulas have been set up for Continental Air Lines (AVIATION WEEK, Nov. 24) and other carriers.

The rate is fixed so that C&S will earn the maximum base mail pay of 34 cents a revenue plane mile when its monthly passenger load factor is below 57 percent. For each one percent increase in the passenger load factor above 56 percent, the base mail rate per plane mile will be decreased by 1.05 cents. The minimum mail payment of 8.5 cents a plane mile will be made during months when Chicago & Southern's passenger load factor is 81 percent or higher.

▶**Incentive Provided**—Since a one percent increase in passenger load factor more than offsets a 1.05-cent drop in mail pay, C&S will have every incentive to boost traffic rather than rely on the maximum possible rate of subsidy. The formula is designed to permit the company to break even under present passenger tariffs at a passenger load factor of about 53 percent.

At its forecast average annual passenger load factor of 60.09 percent, C&S would receive 26 cents a plane mile mail pay and could make a 7.4 percent profit on its investment after taxes. But if the company built up its

NEW HANGAR FOR UNITED

One of two hangars recently opened by United Air Lines at Chicago Municipal Airport, this unit has an entrance door span of 275 ft., a height of 65 ft., and a 120-ft. depth. It can accommodate three DC-6s at one time. With its expanded facilities being brought to virtual completion, UAL now occupies more than 235,000 sq. ft. of floor space in hangars, shops and offices at Chicago.

traffic to an average passenger load factor of 70 percent during a future year, it could earn over 13 percent profit. Still higher load factors would yield still higher profits, just as losses would increase as load factors dropped below 53 percent.

▶**Higher Earnings Possible**—An extra cushion against unforeseen developments is provided to the extent that Chicago & Southern succeeds in developing additional revenues from express, freight and incidental sources above the level forecast by CAB. Similarly, any economies the carrier's management achieves through effective cost controls or improved operating procedures which serve to decrease operating costs below the level estimated by the Board will result in higher earnings.

For the period after C&S extends its service beyond Havana to Caracas, Venezuela, the sliding scale domestic rate will be based on an average mail rate of 21 cents a plane mile at a 60 percent passenger load factor. This lower rate results from the allocation of a greater proportion of common expenses to the expanded operations of Chicago & Southern's international route—which has a separate and higher mail rate. Service on the new route to Caracas is slated to begin within 30 days.

▶**Deficit Vanishes** — C&S President Carleton Putnam expects the new mail formula to yield his company a $250,000 net profit in the first six months of 1948. Under the former rates, a $300,000 deficit for the period appeared in prospect.

Except for the fact that Chicago & Southern's operating costs were found to be excessive during the twelve months ended June 30, 1947, the carrier would have received sufficient additional mail pay to yield an overall profit for 1946 and 1947. CAB decided, however, it should disallow for rate-making purposes $1,078,000 in expense during the twelve-month period which came about largely because of over-expansion.

But the Board complimented the carrier's management for taking early corrective action after traffic turned sharply downward during the first half of 1947 instead of continuing the expected upward spiral. By the second half of last year, economies instituted by C&S brought operating costs down to levels that were considered proper by CAB.

More Convair-Liners

American Airlines put eight additional Convair-Liners into service July 1. Of the 75 Convair-Liners ordered by AA, 19 were in regular operation early this month.

AA and SWA Elect New Officers

American Airlines and Southwest Airways have elected new vice presidents.

William J. Hogan, AA treasurer since May, 1947, was appointed a vice president at a recent board of directors meeting. He will continue to hold the title of treasurer.

Ted R. Mitchell is Southwest's new vice president. He joined the company in 1941 and has been operations manager since its activation as a certificated feederline in December, 1946.

Hogan

Mitchell

Meanwhile, American also announced the election of John G. Zevely as assistant vice president and the resignation of assistant vice president M. T. Stallter. Zevely has been American's general attorney for two years. Stallter left the company to form a television business partnership in Texas.

▶**Other personnel developments:**

CAB—Merrill Armour, assistant chief examiner of the safety enforcement proceedings division, has become the Board's staff liaison officer for federal-state relations.

Colonial—Alfred M. Hudson, vice president, has been placed in complete charge of public relations.

Challenger — William R. Crismon, acting operations manager, has been named operations manager.

Pacific Overseas—J. Edwin Jones was re-elected president at the annual stockholders meeting last month.

TACA—J. Dan Brock has become general traffic manager. He succeeds W. M. McCowan, who resigned to join the traffic organization of Waterman Steamship Corp.

New Feeder for Southwest

Arizona Airways, Phoenix, has been issued the temporary feeder certificate promised by CAB in its Arizona-New Mexico area route decision last February.

The carrier had told the Board that adequate airport facilities are available to permit inauguration of service at 17 of the 20 points on its routes (AVIATION WEEK, June 7). CAB also decided that Arizona Airways had rearranged its financial structure in accordance with conditions for issuing the certificate laid down last February.

President H. O. Nelson hopes to inaugurate DC-3 service this summer over the new routes, which radiate out of Phoenix to Yuma, Douglas and Winslow, Ariz., and El Paso, Tex.

All American Hopes For Feederline Fade

All American Aviation's prospects of swapping all or part of its pickup routes for a feeder system before late fall are growing dim.

The carrier was designated for conventional short-haul services in CAB's Middle Atlantic Area opinion last February. But issuance of the new certificate was made contingent both on a showing of adequate airports and on a finding (within a year) that the feeder routes will not substantially duplicate the company's pickup links.

▶**Protests Aired** — Communities included on AAA's pickup routes (but not designated on the feeder links) hotly protested the proposed suspension of pickup service during recent hearings. The hearings were part of a CAB investigation instituted over a year ago to determine whether the pickup service should be suspended entirely or in part because of high costs and small traffic potential. A finding in this probe appears necessary before the Board can decide whether AAA's pickup and new feeder services would overlap.

With this delay in mind, the Board has granted Chesapeake Airways, Salisbury, Md., a temporary certificate to operate between Washington, D. C., and Maryland's Eastern Shore until Oct. 1. This service to the Delmarva Peninsula vacation areas was one of the routes for which All American was designated last February.

▶**Inauguration Set**—Chesapeake, which has operated DC-3s between Baltimore and Maryland's Eastern Shore since April, 1946, planned to inaugurate the new service out of Washington last week under the temporary certificate. All American also applied for a temporary certificate to conduct the operation this summer, but CAB decided Chesapeake was best equipped to provide the interim service.

Meanwhile, five DC-3s, custom-designed by All American Aviation and Douglas Aircraft Co., are under conversion at Douglas' Santa Monica plant. The planes will be equipped with 24 passenger seats, arranged in a row of eight single seats on the left side and eight double seats on the right. One additional window will be installed on each side for the first row of seats.

PAA Pleads for Domestic Routes

Carrier prepares for last-ditch stand as CAB hears oral argument this week on application.

Pan American Airways has come out swinging in the final round of its contest for domestic routes.

Civil Aeronautics Board is scheduled to hear oral argument this week on PAA's application for eight trunk services linking 13 principal U. S. cities and covering 14,610 miles. And Pan American has already revealed its strategy for beating down the protests of eleven domestic carriers, which fear the proposed competition, and the Post Office Department, which thinks the new routes would result in little benefit for the mail service.

▶**Perils Cited**—In a new brief to the Board, Pan American asserts that with the exception of Panagra it is the only major U. S. airline restricted to international service—where traffic potential is small compared with domestic volume, costs are higher, and operations are at the mercy of unsettled economic and political conditions around the world.

America's greatest natural asset in international air transport lies in the fact that most of international travel is of U. S. origin, PAA declares. "Thus the government should enable its largest international airline to carry international traffic to and from major points of origin in the U. S. as an affirmative policy, not just to catch up with advantages bestowed on foreign operators."

Arguments of domestic airlines, who compete abroad with Pan American, to the effect that competition at home would be uneconomic, particularly in view of their alleged "critical" condition, are invalid, the brief continues. It adds that "there is not a particle of evidence that any difficulties of the domestic airlines are due to lack of traffic or air competition on trunk routes."

▶**PAA Victory Doubtful**—To date, PAA apparently is losing its fight for domestic routes. A CAB examiner early this year urged the Board to deny the carrier's plea for all but one of the eight links requested (AVIATION WEEK, Mar. 8). Financial losses suffered by domestic carriers since PAA originally applied for its U. S. routes early in 1945, together with the unexpected leveling off of traffic last year, undoubtedly will make CAB extremely cautious in authorizing any new service.

Already certificated for over 94,000 miles of international routes, PAA's current application covers domestic links between Boston and Miami via New York, Philadelphia, Baltimore and Washington; Boston and Houston via New Orleans; Chicago and Miami; Detroit and Houston; New York and Seattle; New York and San Francisco; New York and Los Angeles; and Los Angeles and Seattle. All of the points listed are now gateways on Pan American's international services. The CAB examiner recommended that PAA be granted no more than a 1100-mile link from New York to Miami.

▶**TWA Hits Tactics**—Opposition to Pan American's application (which would tap between 32 and 37 percent of all domestic traffic if granted in entirety) is again boiling over. TWA, which competes with PAA internationally, has made an attack on the latter's ethics.

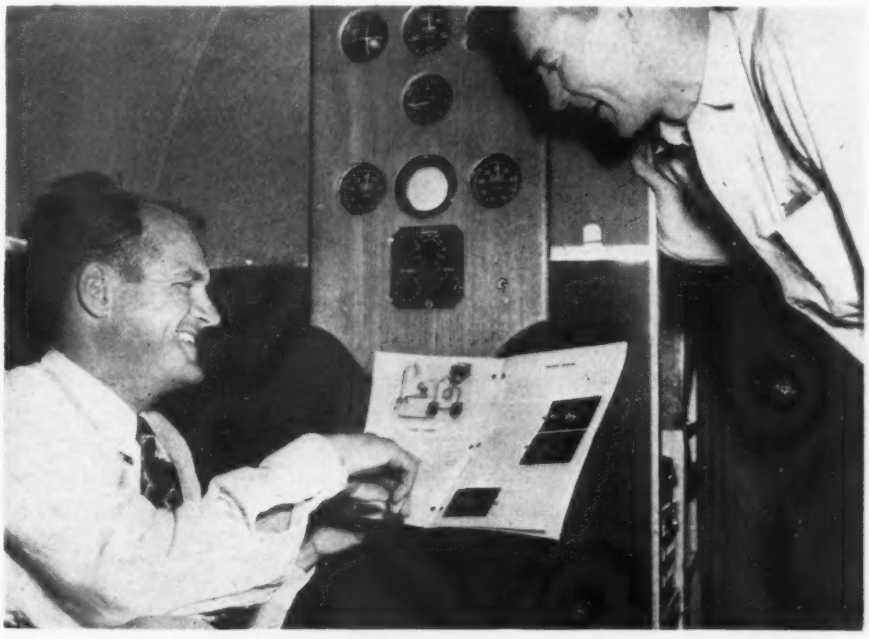
"Motivation behind Pan American's application to enter the domestic field," TWA charges, "is not public convenience and necessity but rather revenge growing out of its losing battle to retain a monopoly of American-flag international air services. PAA has deceived various city officials, whose support they have endeavored to enlist, with promises and proposals to operate larger and faster airplanes than those now in use."

TWA declares that PAA is asking Civil Aeronautics Board to make a colossal gamble on the basis of Pan American estimates that next year's airline traffic will be more than four times last year's volume. "No application in CAB history," TWA concludes, "has been founded on fewer facts or in more guesswork, and yet promises so little advantage for the risk that is demanded."

No New Fire Rules For Now, Says CAB

No new regulations containing blanket prohibitions against airline use of airports lacking adequate fire-fighting equipment are in immediate prospect despite recommendations made last year by the President's Special Board of Inquiry on Air Safety.

The Civil Aeronautics Board has decided this problem should, for the time being, be handled through administrative action by the Civil Aeronautics Administrator under present rules requiring adequate facilities and equipment at airports. CAA is currently using this authority to require airports to acquire



TROUBLE SHOOTER INSTALLED

Demonstrations of the Sperry electronic engine analyzer were recently completed by Pan American Airways for engineers and pilots on its Latin American division. Sperry rigged up the control dials and cathode ray scope indicator in the cabin of PAA's DC-3 flying laboratory. Capt. R. W. Vinal (left), assistant chief pilot for the Latin American division, is shown looking over the installation as Frank Breen, Sperry engineer, explains the device. Brain child of John E. Lindberg, jr., PAA engineer, the engine analyzer was developed in cooperation with Sperry. The analyzer is hooked up to the engines by two sets of wiring—one to the ignition, and the other to small microphones which register vibration within each cylinder.

and maintain ground fire-fighting equipment.

▶ **Standards Lacking**—Impossibility of framing a regulation defining universal minimum standards for what would be "adequate fire-fighting equipment" under the widely varying conditions at thousands of different airports throughout the country was cited as the principal reason for discarding the idea of control by specific regulation.

The President's Special Board of Inquiry on Air Safety had urged adoption of a regulation specifying minimum fire-fighting equipment to be kept on hand at airports and prohibiting scheduled air carrier operations at fields not meeting the minimum standards.

CAB said close study of the proposal and consultation with airports, trade associations, the National Association of Fire Chiefs, insurance organizations and others had produced little in the way of concrete suggestions for reasonable minimum standards in airport fire-fighting equipment.

The Board reported that CAA already has made real progress in improving fire-fighting equipment at airports under existing regulations and will further emphasize the need for improved crash and rescue equipment.

Upshot of CAB's consideration of the long-range problem of aircraft fires at airports was the conclusion that the only wholly satisfactory solution would be development of noninflammable fuel and oil. Extensive research along these lines has been under way for some time by the Fire Prevention Committee of the National Advisory Committee for Aeronautics.

Airline Deficits Still Run High

A sluggish early spring traffic upturn failed to put the domestic air transport industry into the black this year.

In 1947, the 16 certificated domestic carriers showed their first overall operating profit in April. But in April, 1948, they were $1,059,346 in the red and setting their sights on a profit by May.

▶ **Passenger Traffic Down**—Behind the slow comeback from heavy winter losses was the continued slump in passenger business. During the first quarter of 1948, passenger traffic was about five percent under the same 1947 period. In April, the level was a disquieting nine percent under last year's level.

Five carriers—Braniff, Continental, Eastern, Mid-Continent and TWA—flew more revenue passenger miles in April, 1948, than in April, 1947. American showed the greatest decline, from 119,438,000 revenue passenger miles in April last year to 97,959,000 in April, 1948.

▶ **Losses Compared**—The $1,059,346 operating loss in April of this year must be added to the $13,846,086 operating deficit during the first quarter. Since the 16 domestic carriers lost a record $18,743,761 in first quarter 1947, their deficit for the first four months of last year is still considerably higher than in the same 1948 period despite the April results.

Eastern continued to set the pace in profits during April, showing $846,970 operating income, a sizable drop from the $1,306,964 earned in April, 1947. Northwest had the largest operating loss for the month—$455,928.

Joint Terminal Plan Ends

A major experiment by the certificated airlines in the joint use of ground facilities is headed for abandonment.

The Air Transport Association's board of directors has decided to drop the consolidated terminal services at Willow Run Airport, Detroit, after a year of operation. ATA recommended that the Airlines National Terminal Service Co., which manages the Willow Run setup, be dissolved.

Functions performed by ANTSCO for the seven certificated carriers serving Detroit included ticketing, ramp services, handling of baggage, cargo, food and stores and refueling. High costs and lack of efficiency had kept the operation under fire from participating airlines since last summer.

Air Transport Booms in China

Chennault's airline flies supplies to blockaded areas, brings out local products—and makes money.

Civil Air Transport of China has mushroomed in two years from a collection of unflyable war surplus transports rusting in Hawaii to a two million ton-mile a month airline operating over an area larger than the United States. After only 18 months of flight operations, the line has paid off the $2,000,000 (U.S.) loan with which it started and is operating regularly well into the black.

Spark plug of CAT is Maj. Gen. Claire Lee Chennault, wartime commander of the Flying Tigers and the U.S. 14th Force in China. Chennault began his airline career at the age of 56 after 25 years as an air corps fighter pilot and tactician. Most of his air transport lessons were learned during three grim years of war, operating an air force of from 100 to 1000 planes on the end of an airborne supply line across the Hump from India. As president of CAT, Chennault is wrestling with the same basic operational problems of his wartime experience.

▶**C-46 Fleet**—CAT now operates a fleet of 15 C-46s and three C-47s and has been averaging better than a million ton-miles a month since October of 1947, with a peak of two million ton-miles in April. Its routes stretch from the ports of Canton and Shanghai to deep into Chinese Turkestan near the Russian border and from Manchuria to French Indo-China.

Biggest boon to CAT operations has been the Chinese Civil War. Communist tactics have been based on cutting railroads and other land lines of communications between Nationalist-held cities. In these situations the Chinese government relies heavily on CAT to supply food, medical supplies and industrial equipment for the civil population of the beleaguered areas, and to carry their products to markets that would otherwise be cut off by the Communists. During the six-month Communist siege of Mukden in Manchuria, CAT has been the city's only link with the outside world.

▶**Shensi Link**—Cotton has been CAT's main commercial cargo. The C-46s haul raw cotton from the producing centers of Sian and Tsinan across the Communist lines to the great mills of Tsingtao, Taiyuan and Tientsin. On its return trips, CAT carries finished cotton goods, salt, tobacco and food to the blockaded areas. Last winter when snow blocked the runway at Sian, Shensi's capital, the governor put 12,000 coolies to work clearing it so that CAT planes could continue operations. When CAT pilots complained about crosswind landings at Sian, the governor ordered a new runway built to their specifications.

CAT was organized in the summer of 1946, primarily to break a bottleneck in UNRRA relief goods that were piling up in Chinese ports, unable to reach stricken areas in the interior because of lack of transportation. Chennault, whose airmen had been responsible for sinking half the prewar tonnage of China's river shipping and wrecking all of China's main railroad systems when they were Japanese operated, proposed reversing his wartime operations by using the Japanese built fields at Canton and Shanghai as a base for air transport to the former American fields in the interior.

▶**UNRRA Loan**—He got an UNRRA loan of $2,000,000 to buy equipment and raised another $1,000,000 among Chinese businessmen in the interior to finance initial operations. For his main workhorse, Chennault picked the C-46D, backbone of the Hump operation. He bought his planes from war surplus in Hawaii and hired crews in the United States to put them in flying condition and ferry them to China. There they were stripped of 3700 lb. of wartime equipment for a net gain of 3400 lb. in payload (300 lb. in de-icing equipment was added). Streamlining added 10 mph. to the cruising speed of the reconditioned C-46s.

CAT now operates its C-46s at 48,000 lb. gross with a cargo load and 46,000 lb. when passengers are carried. Flight tests have shown these C-46s can get adequate single engine performance up to 5000 ft. with a 48,000-lb. gross. CAT payloads vary from a 10,000 lb. minimum to 12,000 lb., according to airport conditions.

▶**Financial Problems**—CAT's financial problems are fantastic. Its revenues are entirely in Chinese currency that fluctuates hourly and has skyrocketed from an exchange rate of 3000 to one in 1946 to over six million to one in 1948. Contract rates are fixed for only eight days at a time. Gasoline can be bought for only 10 days in advance. The price varies from 60 cents a gallon on the coast to $2 a gallon deep in the interior. Gas accounts for one-third of CAT's operating costs.

The airline now has 800 employes of which 70 percent are Chinese. Americans are mainly pilots, crew chiefs and executives. Salaries have to be changed monthly to keep pace with China's runaway inflation.

Chennault

Chennault has introduced many of the tricks of American airline operation into China although what passengers are carried ride bucket seats or cargo. Flight nurses accompany refugee evacuation flights; Chinese flags are flown outside the cockpit after landing and before takeoff and planes are decorated with the names of various terminals on CAT's routes. Chennault is concerned with building his service on the local problems of the areas CAT serves and spends a lot of time promoting new markets for their produce.

All radio operators are Chinese since they have to speak English as well as Mandarin. Most CAT first pilots are now ex-Marines who used to fly C-46s for the Marine garrison in North China. Some Chinese copilots, trained in the United States during the war on B-24s, are now being used. Chief pilot is Erik Shilling, a fighter pilot with the original Flying Tigers and veteran of CNAC Hump operations.

▶**Overhead Gigantic**—CAT's overhead is gigantic. Because of the lack of normal airways facilities in China, it operates its own weather net, navigation facilities and airport maintenance crews in addition to normal ground crews and sales staff. This is balanced by equally high rates. CNRRA has top priority on all CAT cargo space. The airline can sell all its remaining capacity commercially. Most relief business moves from the coast inland with the backhaul mostly commercial.

▶**Cargo Rates**—CAT carries CNRRA (Chinese National Relief and Rehabilitation Administration) cargo at 60 cents U.S. a ton-mile. This compares with a CNAC, Pan Am affiliate, rate of 90 cents to CNRRA. Trips to combat zones (almost all North China is now a combat zone) are flown at 2½ times

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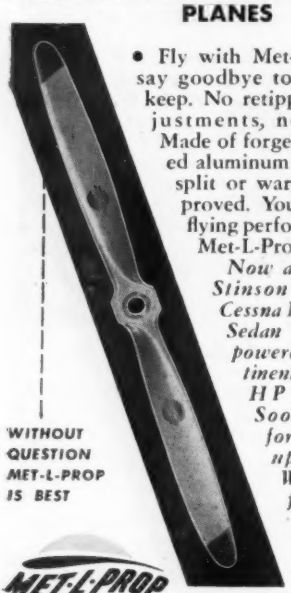

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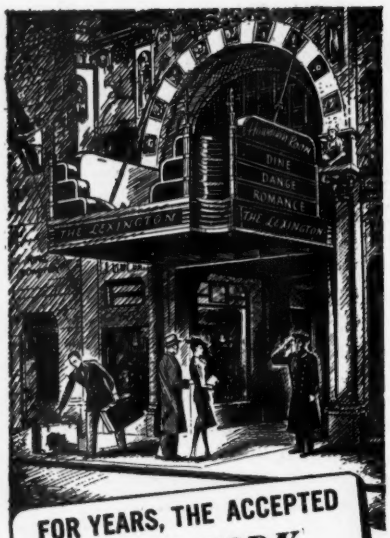

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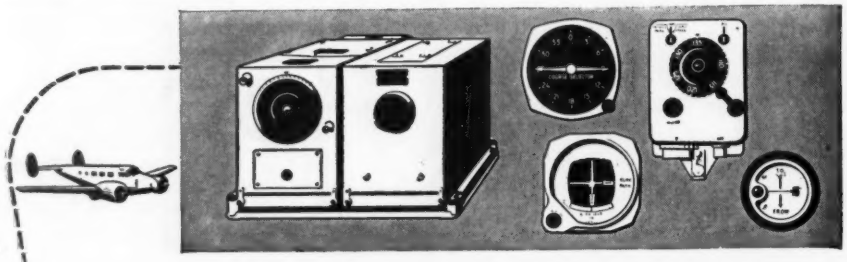

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the normal roundtrip rate. Roundtrip to Mukden now costs 2½ billion Chinese dollars. CAT's cargo space is booked for six months in advance and Chennault estimates the total airlift available in China now including CNAC and CATC is about one-tenth the demand.

Government recently renewed CAT's operating franchise for another year and was impressed not only with the record of relief transport but also with the fact that CAT operations had boosted China's export totals by over a billion dollars last year. Commercial business is based primarily on Chennault's encyclopedic knowledge of China. For example a special type of hog bristles is flown from northwest China that brings $3.50 U.S. per lb. Recently an operation was set up to haul tin from Yunnan mines that had been closed due to lack of transport for getting their ore to a market. With a world tin shortage, it brings $1840 a ton and Chennault's C-46s can haul 300 tons a month from the mines to the French port of Haiphong in Indo-China in 2-hr. flights. Overland, the haul takes a minimum of three months.

News of the ability of CAT to deliver the goods to market has spread all over China, and local provincial governors are petitioning Chennault for CAT service to meet their local needs. Recently the Moslems of Sinkiang appealed to Chennault to extend service to their capital to fly in seeds and agricultural machinery needed to avert a threatened famine. There is no gas available in Sinkiang, but CAT gets there by flying one C-46 tanker along to keep two cargo planes operating on the run.

Flashbulbs Get O.K.

Following extensive tests by government, airline and manufacturers' engineers, nine major airlines have rescinded their ban against shipment of flashbulbs by air.

Original ban followed fear that flashbulbs are liable to premature ignition by radar or other high frequency waves.

Airlines which have rescinded the ban: American, Eastern, Mid-Continent, Monarch, Northeast, Pan-American, TWA, United and Western.

Other airlines have said they will follow suit when official tests and reports are checked by their engineering and tariff departments.

Approve Western Loan

Civil Aeronautics Board has approved Western Air Lines' application for a $2,300,000 loan from the Reconstruction Finance Corp. Money will be used to complete the carrier's financing of Convair-Liners.

CAB to Investigate Hughes' TWA Loan

The Civil Aeronautics Board has de cided to make a thorough investigatior of whether the tightened control How ard Hughes obtained over TWA last year is in the public interest.

Hearings will be directed at a $10, 000,000 loan made by Hughes Too Co. to TWA early in 1947, when the airline was in desperate financial straits Under the loan agreement, the funds were exchanged for TWA's 2¾ percen notes, which are convertible at Hughes option into TWA common stock.

▸**Additional Control Seen**—CAB found that the loan agreement would enable Hughes to acquire up to 80 percen of TWA's common stock, and said a probe is necessary to determine whether this expanded control should be ap- proved. In October, 1944, CAB had sanctioned Hughes' control of abou 45 percent of TWA's common stock

The Board explained that a 45 per cent interest in TWA gave Hughes sufficient power to determine many but not all of the carrier's corporate activities. With a 45 percent holding, Hughes could control TWA's board of directors and thereby manage the day to-day business and financial affairs of the airline.

▸**New Power Defined** — But without the aid of other stockholders, Hughes 45 percent interest was insufficient to permit him to amend TWA's certifi- cate of incorporation or take action with respect to such vital matters as merger, consolidation or dissolution o the carrier. Through conversion of the $10,000,000 worth of notes into com mon stock, Hughes could gain com plete control.

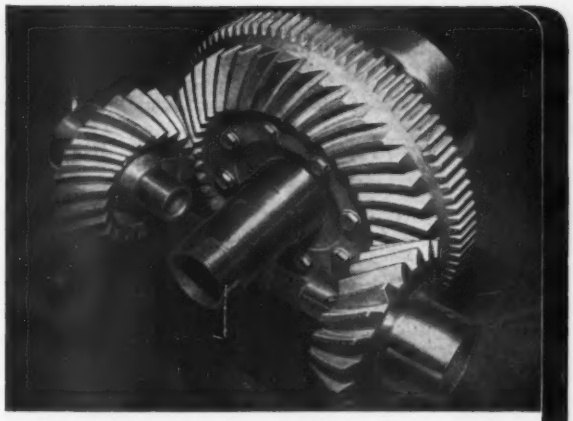
TWA stockholders are slated to vote Aug. 10 on a proposal whereby Hughes would immediately exchange his notes for 1,000,000 shares of TWA common stock (Aviation Week, June 28). This transaction would increase Hughes interest in TWA from 45 percent to about 75 percent.

Fourth of July Peak

United Air Lines hit an all-time peak in passenger traffic early this month

The carrier flew an estimated 17, 452,000 revenue passenger miles over the four-day Fourth of July week end Previous peak was 17,100,000 revenue passenger miles on the Memorial Day week end. During the Fourth of July week end last year, UAL flew 16,500, 000 revenue passenger miles.

Meanwhile, on July 8, United marked a significant milestone in its 22 years of operation by carrying its ten millionth passenger.



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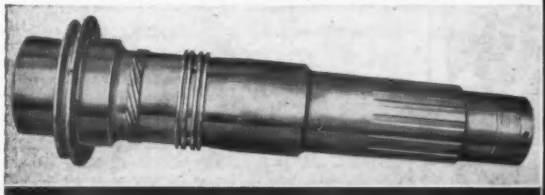

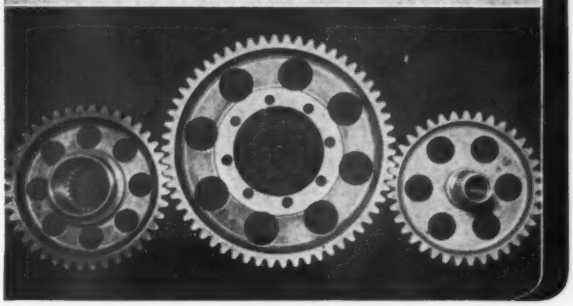

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SHORTLINES

▶ **Consolidated Air Transport**—Has begun regular passenger flights from its home base at Pasco, Wash., to Spokane, Seattle and Portland, Ore. The carrier uses a DC-3 to make four roundtrips weekly.

▶ **Delta**—Will replace its pursers with stewardesses, according to John L. Sutton, superintendent of passenger service. Delta was the first domestic carrier to use pursers as fourth crew members on DC-4s in 1946. Pursers will be transferred to other departments after delivery of the DC-6s now on order. The DC-6s will have two stewardesses.

▶ **Eastern**—E. V. Rickenbacker, president and general manager, has predicted that within five or six years his company will be flying jet transports between Atlanta and New York in 90 minutes.

▶ **Flying Tiger Line**—Has signed an interline cargo agreement with Scandinavian Airlines System providing for a single waybill on shipments between points served by the two carriers.

▶ **Iowa Airplane**—F. C. Anderson, president, expects to activate two of the three segments on his feeder system this summer. The two links, to be operated with DC-3s, are Omaha to North Platte, Neb., and Omaha to Huron S. D. Activation of a third segment from Omaha to Minneapolis has not been authorized by CAB due to inadequate airport facilities at intermediate points.

▶ **Metropolitan Aviation Corp.**—Has applied for a CAB certificate to carry passengers, property and mail by helicopter in the New York metropolitan area over three routes radiating out of LaGuardia Field and one link out of Newark Airport. Based at Teterboro, N. J., the company has engaged in commercial helicopter operations in the New York area since June, 1947, using two Bell 47Bs, according to Felix Vidal, vice president and general manager.

▶ **National**—Inaugurated through DC-6 service between New York and Havana this month.

▶ **Piedmont**—Reports operating costs decreased from $1.86 a plane mile in February to $1.56 in March, 99.9 cents in April and 98.7 cents in May. The feeder carried 2800 revenue passengers 723,000 passenger miles in May, bringing total passenger miles flown since inauguration of service in February to 1,331,754. Company is operating all segments of its 1750-mile system. Plane utilization during May reached 9.57 hours daily.

▶ **Riddle Aviation Co.**—Reports a $69,279 earned deficit through Mar. 31, 1948. The Miami-based cargo operator lost $74,258 through Dec. 31, 1947, but earned $4979 profit in the first quarter of this year. Current assets on Mar. 31 aggregated $91,329, total assets $210,849, current liabilities $81,251. Personnel numbered 38.

▶ **Southwest Airways**—Revenue passengers rose from 5769 in April to 8460 in May, with mail, express and freight also showing large gains. Traffic was slightly above May of last year.

▶ **Trans-Canada**—Has inaugurated direct service from Montreal and Toronto to Bermuda with DC-4Ms.

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CAB SCHEDULE

July 19—Oral argument in Pan American Airways' domestic route case. (Docket 1803.)

July 26—Hearing on Pan American Airways' Pacific certificate amendment case. (Docket 2953.)

July 26—Hearing on foreign air carrier permit application of Servicos Aereos Cruzeiro do Sul. (Docket 3336.)

July 27—Hearing on National Airlines route consolidation case. (Docket 2967.)

July 29—Oral argument on complaints by Air Line Pilots Association and International Association of Machinists against National Airlines. (Dockets 3283 and 3298.)

Aug. 2—Hearing on suspension of Trans-Atlantic Airways' letter of registration as nonscheduled carrier. (Docket 3358.)

Sept. 13—Hearing on Board's investigation of free and reduced rate transportation. (Docket 2737, et al.)

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Acme—16; International News—11, 30.

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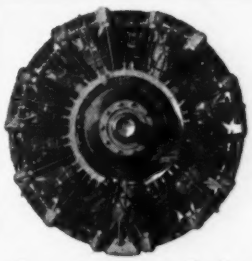

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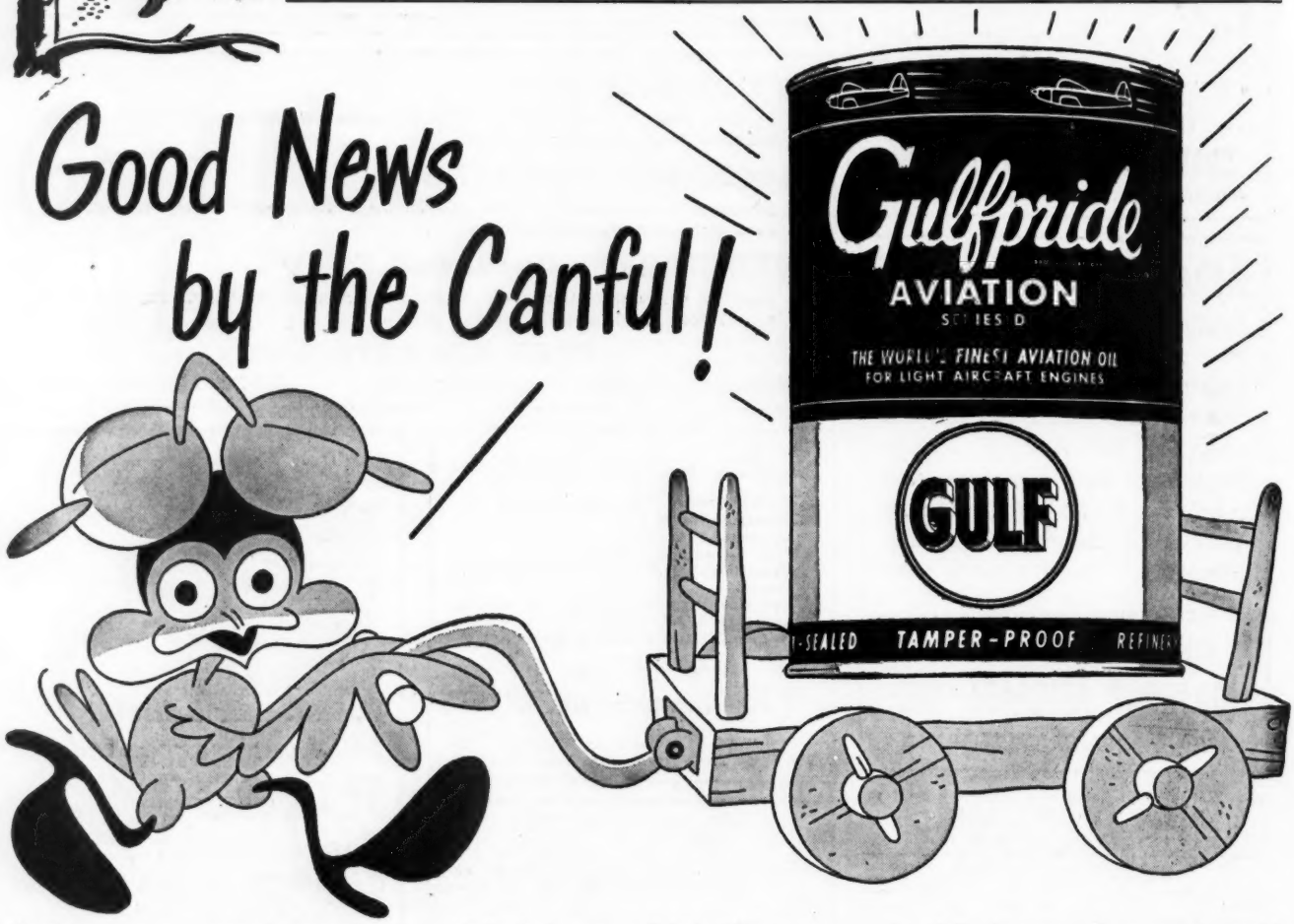

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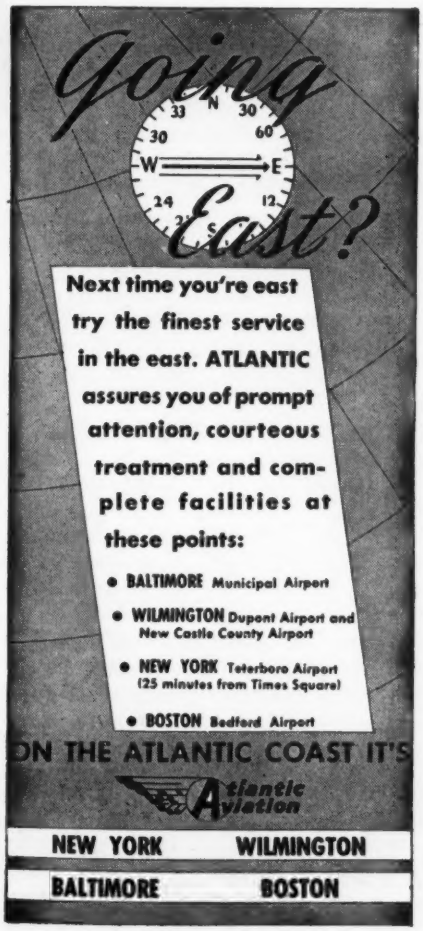
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EDITORIAL

Important Step in Air Safety

Activation of the Flight Safety Foundation is one heartening sign of maturity in a youthful and, for that reason, a sometimes short-sighted industry. The crucial test of maturity will be the extent of financial contributions. But it is unthinkable that the unique safety organization will not be supported by an industry whose very existence depends on maintaining and improving public safety.

For, as the Foundation itself points out so well in its prospectus:

"Every fatal accident, in any type of aircraft, feeds the public's exaggerated fear of flying and causes economic losses, unparalleled in any other field of transportation. The public continues to associate flying with danger even when the safety achieved in certain forms of flying is good, such as the record of the scheduled airlines. The public demand for greater safety in flying is exceeded only by the aviation industry's desire to improve it. But the best effort is not yet good enough.

"The Flight Safety Foundation will wage a strong, continuous safety campaign without self-seeking publicity, and in cooperation with the aviation industry. It will conduct safety research and establish an aviation center where safety education and safety knowledge will be coordinated, expanded and disseminated throughout the industry. It will undertake to acquaint the public with current safety practices and proved safety developments in aviation. The ultimate result of the Foundation's safety activities should be to strengthen public confidence in aviation."

There has never been a coordination of safety efforts between or among industry, government, and research agencies, nor a pooling of safety lessons or findings.

Generally, as a group, the scheduled airlines have been more aggressive and alert to safety than the lightplane industry, but the traditional unwillingness of the various lines to work closely together has left much to be desired in exchanging detailed information. Significantly, the CAA shortly will demand that the various carriers forward their engineering and safety reports to Washington for maximum usage of the information. It took a government agency to pool this material for its maximum availability. Only a few days ago an outstanding equipment manufacturer first learned from a report in this magazine that a leading carrier had modified the manufacturer's item on all of the airline's transports. It is doubtful that other lines which may have been using the same equipment were notified.

In the past there have been some—definitely not all—lightplane manufacturers who were willing to pay lip service to safety as long as the pecuniary costs were not considered unreasonable. Sometimes they have considered their responsibilities fulfilled if they furnished a fairly comfortable, attractive plane that flew under favorable circumstances. They considered such a proposal as engineering the aircraft for maximum protection of the occupants in event of a crash as beyond the manufacturer's obligation to his customer.

While it is by no means typical today of the hard-pressed lightplane industry, in the past too many manufacturers have closed their eyes, even to constructive criticism, to such an extent that they have refused to acknowledge receipt of safety reports from research groups concerning findings of the manufacturers' own aircraft. The stock answer: Changes would bankrupt the company.

Likewise, past standards of flight operation and instruction have been sloppy. Such groups as the National Aviation Trades Association have made sincere efforts to disseminate worthwhile information, but reliable, co-ordinated safety findings have been sparse, and difficult to dig out.

There are few more general topics of squawking in aviation than government over-regulation. The wails are usually justified. But the vociferous complainants seem seldom to realize, as was pointed out by the President's Special Board of Inquiry on Air Safety, that "the industry should welcome the idea of doing its own policing as far as safety is concerned. It would be a step away from bureaucracy."

So, because of the keen competition between manufacturers, between the air carriers, and among the fixed base operators, past suggestions for pooling safety information have been greeted coolly. "Why should we give away our weaknesses to our competitors?"

The problem was put well by Milton W. Arnold, airline industry representative on the President's Special Board:

"In the study of fire prevention, there has been evident a certain lack of coordination that characterizes efforts in this field. This lack is not unusual but is rather the natural result of activity spontaneously emanating from different sources. Various aspects of the problem were being explored by different federal agencies as well as the industry; but no rounded program is in the making with definite objective and with each unit designated to develop the phase that it knows best, nor is there any all-embracing research budget provided for this problem common to the whole industry. Moreover, the reduction of fire hazards in aviation is only to a minor extent that of regulation and of governmental supervision. The prime advances will derive from research, and the experiences of the last war demonstrate that coordination in research on a common problem is of the highest value . . ."

Certainly, in the independent, non-profit Foundation there is hope for a coordinating agency sympathetic to both industry and the public welfare, which can be trusted as an impartial research body and information exchange.

The new Flight Safety Foundation is not the single answer to all air safety, and the other excellent groups at work on various special phases are needed for an all-out and continuing effort to save lives. The new organization must have time and financial aid to reach its maximum value to aviation.

But there is every indication that here aviation has a public spirited group of men of experience and integrity who know the problems of aviation as well as does industry.

They are independent, specialists in safety itself, who have no ax to grind. Aviation could find few more men it could better trust for this important but always thankless task than Jerome Lederer, its president; Hugh De Haven, vice president, who has carried on highly important work at the Crash-Injury Research Project at Cornell University; Eugene Norris, project engineer and formerly with the Aircraft Industries Association and Luscombe Airplane Corp., and Paul M. Fitts, jr., chief of the psychological branch of the Aero Medical Laboratory at Wright Field; Eugene F. Du Bois, chairman; Richard T. Crane, vice chairman; Melvin Gough of Johns Hopkins; David K. Morrison, secretary; and the other associates.

ROBERT H. WOOD

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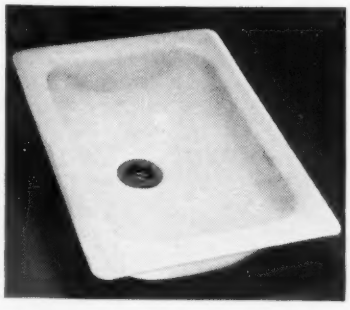

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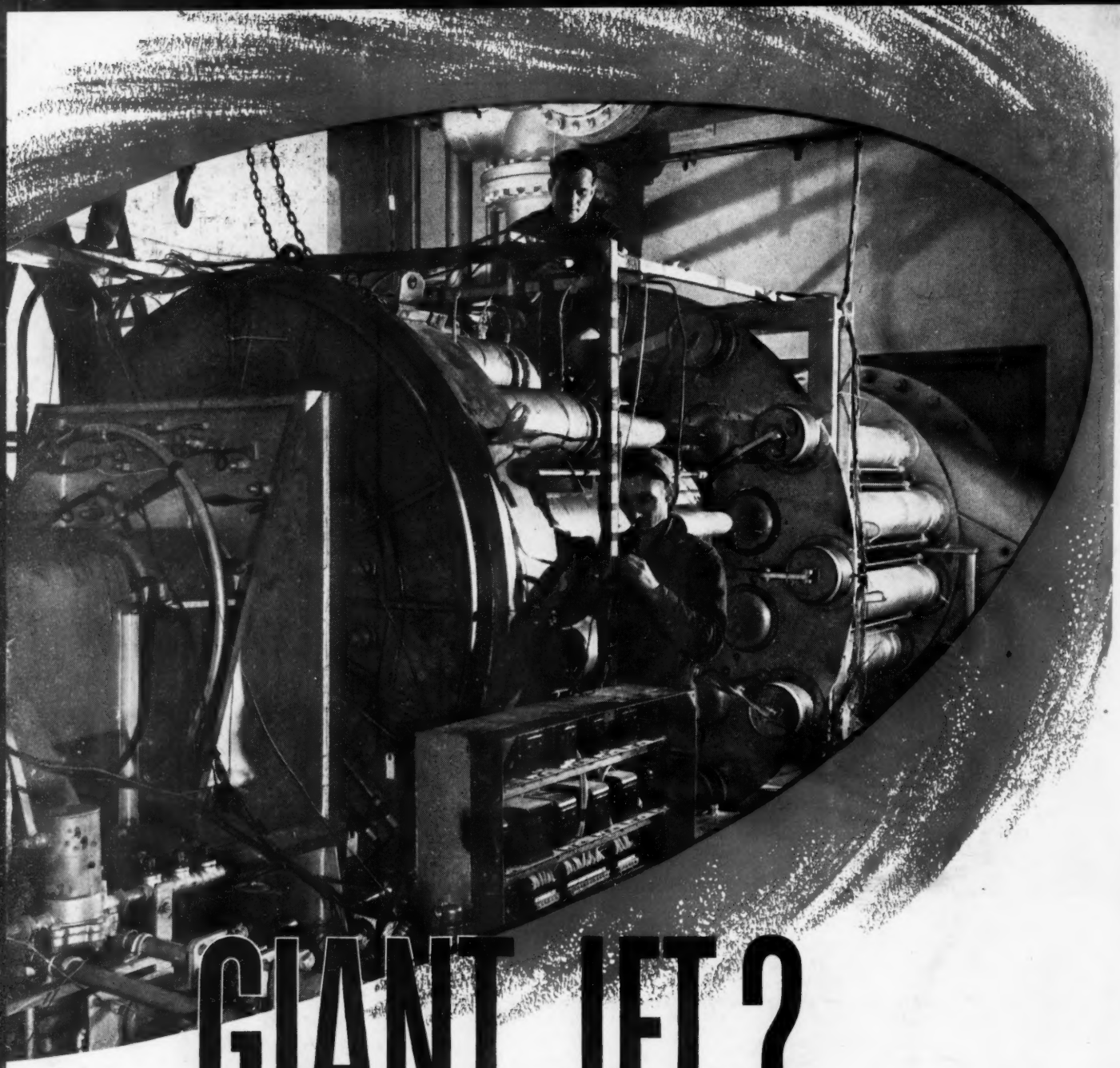

GIANT JET?

- MOTORS AND CONTROL
- INSTRUMENTS
- TURBOSUPERCHARGERS
- CABIN SUPERCHARGERS
- GAS TURBINES FOR JET PROPULSION
- IGNITION AND POWER SYSTEMS
- AUTOMATIC PILOT
- GENERATORS AND TRANSFORMERS

This huge structure is not an oversize jet engine, although the resemblance is striking. Actually it's the modern test stand for jet engine turbine elements at General Electric's new jet aircraft gas turbine laboratory in Lynn, Mass., where turbines as large as 30,000 horsepower will be tested under simulated operating conditions.

This fine laboratory is part of the $25,000,000 center for the development, testing and production of aircraft jet engines. The new facilities are the largest and most outstanding of their kind, and constitute part of G.E.'s long-range program in the jet propulsion field—a program started when General Electric built the first jet engine for the Air Force.

In factories like these, engineered systems, instruments and all types of devices for aircraft are constantly being developed and produced by our experienced aviation technicians. Your nearest G-E office will refer your problem to them. *Apparatus Department, General Electric Company, Schenectady 5, New York.*

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